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POINTS FOR PRODUCERS.

Mouse-infected Hay.

Mouse-infected hay is very dangerous to horses because of changes brought about in it by the mice and their dung, also by moulds which grow in it from them, says the Veterinary Lecturer. The best and safest treatment of it is not to give it to them, and there is no other that is reliable. If it has to be given, then one must reckon up its cost in terms of dead horses. A palliative measure would be to open it up before chaffing and allow the sun to play on it for some hours and mix salt at the rate of 5lbs. to 7lbs. per ton with it, and if very bad to mix sulphur at the rate of 3lbs. or 4lbs. per ton with it, but this is best done as it is fed rather than in bulk. Molasses, much as the Veterinary Lecturer dislikes it for horses, may be of some use in counteracting the trouble, not more than ¼lb. per day per horse being given.

Drenching a Pig.

White, in his "Farriery," published over 200 years ago, says when he reaches the section on pigs, "Pigs, like other animals, have many diseases, but you may as well drench the devil as drench a pig." This is good advice, and whenever possible medicine should be given in the food or mixed with honey or molasses on a stick, and so put in the mouth, says the Veterinary Lecturer (Mr. Place). If drenching is unavoidable, take an old shoe or boot and cut a fair sized hole at the toe, snub the pig up in a corner with a slip round the upper jaw, not round the snout only, put the shoe in the mouth, and raise the head, but not over high; when the music ceases pour a little water or milk into the shoe and let it be swallowed. When this is going on satisfactorily, the medicine may follow slowly and steadily. If there is any choking or coughing, let the head down and do not give the rest of the drench.

Lime for Horses.

Lime is one of the requirements of horses in South Australia that is frequently lacking both in pasture and house feed. It may be given as a tablespoon of slaked lime mixed with feed occasionally, but is better absorbed if given as lime water, says the Veterinary Lecturer. This is made by taking a lump of quicklime as big as a goose egg and putting it into 2galls. water for 24 hours, then decanting off the clear liquor and mixing it with the feed at the rate of half a pint a horse a day or occasionally when it seems to be required because of earth or dung eating, rough coat, and so on. It is a good preventive for worm troubles.

Alcohol as a Source of Power.

From the Department of Chemistry has been received Bulletin No. 8, being a paper prepared by Mr. W. T. Rowe, F.I.C., on investigation so far conducted for the purpose of ascertaining the possibility of making the manufacture of alcohol as a source of power a commercial success. The Director of Chemistry (Dr. Hargreaves, M.A., B.C.E., F.I.C.), in a letter of transmittal, states that so far as our present productions in South Australia are concerned, we can only look to cereals and straw as sufficient in quantity to provide enough alcohol to replace imported petrol. It may be possible to increase the output of potatoes and make them available. Alcohol can be made from cereals on a large commercial scale; but they form an expensive raw material, and they are more valuable as fuel for human beings and animals than for motor engines. The production of alcohol from straw on a payable basis is problematical, but if further investigation shows that straw can be utilised, it will be a valuable asset to South Australia, where enormous quantities of straw are at present wasted.

The Paddy Melon

The notes by Mr. F. E. Place, B.V.Sc., M.R.C.V.S., which appeared in last month's issue of the *Journal*, dealing with the Paddy Melon (*Cucumis myriocarpus*, Naudin), says H. W. Andrew (Botanical Assistant and Quarantine Officer for Plants, S.A.), throw some interesting light on the character of another undesirable weed, which unfortunately is well established in many parts of this State and Victoria, though it is a native of South Africa. In Victoria it is known commonly by the more appropriate name of the Gooseberry Cucumber. While Mr. Place has furnished some welcome information concerning the veterinary surgeon's estimate of this plant's injurious effects on horses, it may not be considered amiss to draw attention here to one or two additional points regarding it. That this is a troublesome plant is also borne out by the fact that it is proclaimed a "weed pest" under the Federal Quarantine Act. It is very plentiful along the Upper Murray, and widely spread over this State. Recently, in the Middle North district of this State, I was struck with the thick carpeting—on certain fallows—formed by the luxuriant and spreading growth of the Paddy melon and the degenerate Water or Pie melon (*Citrullus vulgaris*, Schrad.), growing in close association. Scores of thousands of fruits of the latter averaging about 5in. in diameter, in addition to innumerable Paddy melon fruits, must have come under view, and conveyed a vivid idea of the great future increase of plants probably arising on the decay of the fruits and dispersal of the seeds. When it is remembered what enormous quantities of water are given off by the leaves of so many plants it will be realised that these wild melons must constitute a big drain on the moisture content of soils, apart from the mineral foods taken up in solution by the roots. This drain on the reserve moisture of the soil, too, takes place in the case of these plants during the summer and autumn immediately before the sowing of the wheat or other crop for which all possible moisture should be conserved, especially in the drier districts.

Imports and Exports of Fruits, Plants, Etc.

During the month of May, 1917, 12,054bush. of fresh fruits, 17,732bush. of bananas, 4,300 bags of potatoes, 404 bags of onions, and 172 packages of plants, trees, etc., 2,161 empty wine casks, and 480 empty cases were examined and admitted at Adelaide and Port Adelaide under the Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910; 58bush. of bananas (overripe) were destroyed. 126 empty wine casks were fumigated, and 480 empty cases were returned to the exporting State. Under the Federal Commerce Act, 176 packages of dried fruit, 110 packages of preserved fruit, and 400 packages of honey were exported to oversea markets. These were consigned as follows:—For New Zealand, 176 packages dried and 110 packages of preserved fruit; for Bombay, 400 packages of honey. Under the Federal Quarantine Act, 2,956 packages of plants, seeds, etc., were examined and admitted from oversea sources.

BLACK APHIS.

"I advise, from long experience, the use of tobacco and soap wash with a little resin wash added -one pint to each gallon of tobacco-soap solution—as a spray," says the Horticultural Instructor (Mr. G. Quinn) to a correspondent seeking information as to treatment for black aphis. "To overcome this pest about three sprayings at intervals of a couple of days between each should be applied as soon as the presence of the pest is detected. To make the tobacco and soap wash, simmer refuse tobacco, 2ozs. to 4ozs. to the gallon of water, say, for an hour or two, and dissolve the same quantity of common soap by boiling it in a little water and then blend it with the tobacco liquor. To make resin-wash boil ½lb. of soap and 1lb. of washing soda in a couple of gallons of water, and then add 1lb. of finely powdered resin, stirring and boiling until it dissolves. If applied hot this compound is a very effective aphicide."

INQUIRY DEPARTMENT.

Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."

[Extraordinary pressure on space has rendered it necessary to very considerably curtail the inquiry department. Replies to those questions of more general interest only have been published; however, every query received has been replied to through the post.—ED.]

VETERINARY INQUIRIES.

[Replies supplied by Mr. F. E. PLACE, B.V.Sc., M.R.C.V.S., Veterinary Lecturer.]

"J. S.," Forster, reports foals with inability to draw milk.

Reply—The first thing to do when a foal will not or cannot suck is to clear its bowels. This can be done by smearing the finger with glycerine and removing the birth dung or meconium that will be found in the hind gut. Sometimes a piece of soap inserted will do. The mouth should also be examined for structural defects, and sometimes the brown body known as hippomanes will be found in it; if so it must be removed. If a foal cannot draw the milk there is generally some congenital defect, and the mare must be milked and the foal fed with a bottle. Probably in most cases such foals are more economical if destroyed.

"Inquirer," Hamley Bridge, has draught horses itchy on legs.

Reply—The itchiness is probably caused by a parasite known as chorioptic acarine; it may be relieved by dressing the horses legs each evening with a mixture of one part petrol to five parts olive oil. This must not be done with a light anywhere near, as the petrol would catch alight. Also give a flat tablespoon of sulphur once daily in feed for 10 days. Glycerine is derived from fat during the process of soap making.

"B. D.," Wokurna, has roan mare, 8 years, which appeared to have colic about three weeks ago, and improved with ordinary treatment; but now mopes, does not eat, although hungry, grinds teeth, and slimy froth falls from mouth, urine dark, thick, and oily.

Reply—The symptons all point to some of the original drench having gone the wrong way, and a cure is doubtful. She should have improved on the arsenic treatment now being given; but it might be well to change it to 10 drops tr. nux vomica and 10 drops tr. camphor in honey on tongue three times a day for a week.

"E. W. F.," Mangalo P.O., *via* Franklin Harbor, has a pony mare which foundered on sorghum, hoofs coming off.

Reply—As the mischief has existed two months a recovery is not likely, but if treatment is desired, give her 10 drops tr. arsenicum morning and evening on the tongue for a month and dress the feet daily with Stockholm tar, walls and soles. If recovery takes place it will take quite six months. She will do better if she can be kept in wet earth or mud most of her time.

"F. C. T.," Meribah, has horses which foundered on wheat.

Reply—The founder or laminitis is always in the feet, between the sensitive and horny parts. In the two cases in hand the best treatment will be to dress the feet all over with Stockholm tar every day and let them run in a

paddock where there is not too much feed. It will also be advisable to give them 10 drops of tr. arsenicum morning and evening for about a month. The tenderness may exist for many weeks until the hoof is renewed.

"A. G. S.," Caltowie, has horses rubbing tails and stamping. One, 15 years, with difficulty in working jaws.

Reply—The symptoms of the horses point to worms and lice, search carefully under mane and around tail for these, and if found treat as often indicated in these replies. If there is yellow dust under the vent then worms in the hind bowel will be the trouble, and may be expelled by giving each horse a 6 dram physic ball.

"A. D.," Yacka, has a horse sluggish at work, no pain, died two days later. *Post mortem* showed inflammation of lungs.

Reply—The treatment, aconite and nux vomica, were quite right, but should have been given a fortnight earlier. The indications of lung diseases are not well appreciated by farmers in South Australia. As long as a horse can stand he is supposed to be fit for work, where, as when he has anything wrong with his lungs, he is obliged to stand.

"Coreonda," Hamley Bridge, has horses sore and rubbing.

Reply—The symptons point to lice, the horse has two breeds on him different from fowl lice. Look carefully under the mane and on the shoulders. Stand him in the sun and wash with hot soap and soda water in which there is 5 per cent. coal tar disinfectant, such as British Lysol, and when dry wipe lightly over with petrol one part to olive oil five parts; this last may have to be done daily for some days, and all harness, &c., must be carefully disinfected. Petrol and oil suit for this purpose.

"F. F.," Long Flat, has a calf, 4 months old, which would not suck, but has been brought up on bottle; cannot drink easily now, but eats green food readily and chews cud, grinds teeth, weak and miserable.

Reply—Value of labor expended on calf at 8d. per hour, about 50s., value of calf 30d. There is some congenital deformity, and the calf will never make a good breeder, so realise on its skin.

"C. J.," Forreston, reports that cows slipping calves.

Reply—It is to be feared that you have the troublesome contagious form of abortion among your cows, and any that have slime about their tail while carrying a calf or after calving must be strictly isolated if you do not want to ruin your dairy. Obtain a bottle of L.G.B. tabloids, Burroughs, Wellcome, and Co., from the chemist. Dissolve one in a pint of warm water in an enamel, not metal, vessel, and with a glass syringe inject into the bearing, and wipe tail and parts with the solution also. Do this once a week for a few weeks. Any cow that has slipped should be so treated daily for a few days after and also before being served. The bull after service should be cleaned with the same, but half strength. All sling calves, membranes, &c., to be burnt, and cows kept away from place where it happened. If any more trouble write to Chief Inspector of Stock, Adelaide, and ask for an officer to inspect.

"W. E. T.," Forster, has cows which suddenly go off milk, eyes run, gradually recover.

Rely—This condition is known as "ting," and is a lymphatic fever. Beyond the slight loss from decrease of milk it is, as a rule, not serious. It may be combated by bleeding at the nose vein or giving a dose of opening medicine, such as ½lb. of Epsom salts.

"A. E. H.," Finniss, has sheep with jaws stiff, stand about for a week or so, then lie down for another, and gradually die.

Reply—Stinkwort is highly indigestible, but not likely to bring about the symptoms mentioned, which are very probably due to a fluke. If the liver of a dead sheep is sent to me I can settle this point definitely. Benefit may follow the use of the following lick:—Salt, 40 parts; slaked lime, 10 parts; super., five parts; sulphate of iron, two parts; resin, one part. If the sheep do not take readily to it a little cocky chaff and bran added on top will probably entice them. Of course sheep already attacked will not take the lick, but may be dosed with Cooper's tablets with advantage.

"A. B., Halidon, seeks advice regarding white pigs and sun scald.

Reply—The preventive is to keep black pigs instead, they will pay better at Halidon than white. Otherwise keep them well oiled with some cheap oil, such as train oil or crude vaseline. The Americans have automatic oilers against which the pigs rub. In the mallee a creep through which they had to pass to feed lined with bags stuffed with cocky chaff and well oiled would do.

"A. B.," Narridy, reports horses death from paralysis.

Reply—These are caused by the moulds in hay destroyed by mice. These moulds would in the ordinary course of events not do more than cause colic, but in the presence of bloodworms are inoculated into the blood stream, and mixing with poisons excreted by the bloodworms bring about the fatal results. The toxins are similar to those produced in man by poisonous mushrooms. All the world over the matter is being carefully investigated, but the only thing that stands out clearly is that *if you do not want to lose horses do not give them damaged hay.* Prevention is far better than attempted cure, the latter requires skilled veterinary aid, which is most difficult to get just now, while the former lies in the farmers' hands. The main lines of treatment are empty the bowels with aloes, give quinine as an internal antiseptic, and Fowler's solution of arsenic to affect the worms.

"A. L. B.," Orroroo, reports Merino wether hoggets all very fat on good green grass and saltbush, carry heavy fleeces, bred by owner, and always in good condition, watered at well of good fresh water, have been in mallee and acacia paddock with ewes and lambs. When bad, very deep at flank, like a ewe heavy in lamb. *Post mortem*, bladder very full, big, dark, containing water; about a gallon of water around entrails. Watery under skin and jelly like under skin on belly. Fat around kidney discolored.

Reply—It is quite a treat to come across a man who makes a *post mortem*, and notices what he sees and gives the points necessary, although in this case having got to the kidney fat a cut more into the kidney would have revealed congestion. The points are:—Young wethers, off inferior feed on to good, condition rapidly improving, carry heavy fleeces. All the *post mortem* appearances noted. The disease is the one so often referred to as sarcosporidiosis, caused by a parasite which develops in the blood cells and destroys them, bringing about the congestive and dropsical symptoms noted. Practically all sheep are more or less infested with these, but when the blood is improving, on good feed, then they become more active, and carrying a heavy fleece is a drain on the system, which it cannot support under the circumstances. Often the report is of ewes carrying twin lambs, drain in another direction. Deaths are generally said to be sudden, but here we have an observer who notices early symptoms, and puts the practical question: "Would they be fit for food if killed when first noticed?" With the average man probably not, as he would not see them till nearly dead. With this observer they would be fit, but the flesh would probably not set very well, so that they would hardly be first class. Slaughter in the early stages is the best way of handling them. With regard to treatment.—Do not keep them more than a few days on the same pasture, keep moving them round so that at least a week elapses before they come back to the same paddock, because they pick up the parasites from the lower leaves of herbage, and if not biting too tight avoid them, also because a week of sun and air goes a long way to clean a paddock of parsites dropped in the dung. Arsenic is a remedy that does good in the early stages, and a convenient way of giving it is in the form of Cooper's tablets, which can be easily slipped down a sheep's throat. Bleeding at eye or leg veins is of use. And when sheep will take it a lick composed of salt 40 parts, slaked lime 20 parts, superphosphate 10 parts, resin five parts, and saltpetre five parts, will be found to be a preventive. In a case that looks like dying the belly may be tapped by inserting a fine cannula at the lower part of the dropsical swelling; in skilled hands this operation will save several. In moving the sheep it is well to move on to slightly poorer feed when possible so as to check the blood formation.

"W. J. C.," Auburn, asks for preventive measures in the case of horses on mousy chaff.

Reply—The only safe way to deal with such chaff is not to feed it to horses, but if it is a choice between that and starvation, a good deal of labor must be

expended in laying it out in the sun day by day so that it can be exposed to the action of the air and light, putting sulphur on it at the rate of about 4ozs. per hundredweight before feeding, also salt and possibly molasses. Drugs are of no use, but if such chaff is fed in quantity the horses' bowels should be kept active with a good dose of Epsom salts, 6-8ozs. each Saturday evening. My personal opinion of the use of such chaff is that it is more economical to burn it than to feed it.

"H. J. J.," Inman Valley, had cow, 12 hours after calving cow milked and calf removed, cow apparently well, given feed and loose hay, 12 hours later cow found unable to rise; 10ozs. of Epsom salts with ginger and saltpetre. Cow gradually grew worse, and as inflammation was supposed to exist somewhere she was destroyed. *Post mortem*, organs normal, inside womb a number of lumps of yellow-colored flesh, honeycombed on outside. The heart seemed very flabby and unlike the heart of a bullock killed for meat.

Reply—The symptoms point to *post* parturient paralysis, commonly called milk fever, or better, dropping after calving. The cow should have had her udder distended with air and been made comfortable, when she would have probably got up in a few hours all right, if the flabby heart described was not diseased, and it may not have been, as such flabbiness sometimes accompanies the upset of the circulation which causes the trouble, this consists of a sudden flow of blood into the large vessels of the abdomen on account of the partial vacuum resulting from the birth of the calf, this robs the brain of its blood supply and so the paralysis results. The condition of the womb was quite normal, the growths described being the cotyledons through which before birth the calf received nutriment from the dam. It is not a good plan to remove the calf and milk out a cow so soon; in the writer's opinion, in cases where the cow is left with the calf and not milked out the disease is very rare.

DRAKE AS A FODDER FOR STOCK.

"In spite of what some people say, that drake is good fattening food, it cannot be recommended. The plant, *Lolium temulentum*, has the reputation for being the only one of the family *Gramineae* of a poisonous nature. The common name, 'drake,' is a corruption of 'dronk,' or drunk, and the symptoms produced are those of drunkenness," says the Veterinary Lecturer. "Seven pounds of drake have proved fatal to a medium draught horse, and there is little doubt but that continuous small doses have a detrimental effect. It is like whisky, apparently a jolly fine thing, but a poison all the same; the poison is in the grain."

THE DAIRYING INDUSTRY.

CONFERENCE OF FACTORY MANAGERS.

For the first time in this State, representatives of the various butter, bacon, and cheese factories met in conference to discuss the industry, its prospects, and its difficulties.

The gathering was convened under the auspices of the Advisory Board of Agriculture, and the arrangements were in the hands of a subcommittee consisting of Professor A. J. Perkins (Director of Agriculture), Messrs. A. M. Dawkins, C. J. Tuckwell, and the Acting Secretary (H. J. Finnis).

The initial meeting took place in the Wool Exchange, Grenfell Street, Adelaide, on Tuesday, June 19th, the chair being occupied by Mr. F. Coleman (the Chairman of the Advisory Board). Proceedings were opened by the Hon. C. Goode, M.P., Minister of Agriculture.

A Forward Movement.

The Minister of Agriculture, in the course of an inspiring address, said he regarded the gathering as most important, and hoped that it would be repeated annually. Hitherto South Australia had lagged behind in dairying, but he trusted that this fixture would mark the beginning of a noteworthy forward movement. With the increased attention devoted to the business, the opening up of irrigation areas along the Murray, and the closer settlement of other lands suitable for dairying, the State should be able not only to meet all its own requirements, but also to build up a large and permanent export trade. Statistics showed that the number of dairy cows in the State had diminished from 121,803 in 1911 to 91,181 in 1914 (the drought year). The following year, however, the aggregate had advanced again to 100,662, which included 22,147 heifers of from one to two years. When those young animals came into production, they could look forward to a considerable increase in the output of dairy produce. Recognising the seriousness of the shortage, and the demand for animals by returned soldiers, the Government had, in the last 12 months, imported 620 cows and heifers and 20 bulls from the eastern States. It was encouraging to know that the soldiers already settled on the Wall reclamation area were earning approximately from £2 12s. to £3 a week from dairy products. The Government felt that it was better to encourage the soldiers to engage in dairying than in fruitgrowing, as the former industry apparently had brighter prospects from the standpoint of the State as well as of the individual. (Hear, hear.) It would interest them to know that in 1910 the average production of milk per cow in South Australia was 288galls., compared with 278galls. from the cows throughout the Commonwealth. In 1913 and 1914, however, the South Australian yield had decreased to 256galls. and 244galls. respectively,

Representatives of the various Butter, Bacon, and Cheese Factories, and Officers of the Department of Agriculture who attended the Conference.

whereas the Commonwealth return had advanced to 282galls. and 283galls. respectively. The approximate average production of butter fat in the State per cow was 100lbs., equal to 117lbs. of butter. Twenty-five years ago the average for Denmark had been 112lbs., and the present average for that country was 224lbs. That remarkably fine position had been brought about chiefly by herd testing and selective breeding. The Department of Agriculture in this State was conducting a test of the leading dairy stud herds, and a number of the more progressive dairymen had also availed themselves of the opportunity thus afforded for ascertaining the productive value of their cows. It was gratifying to find that several gentlemen, including Messrs. Peter Wood and Robert Melrose, had launched out as breeders and importers of high class pure-bred dairy cattle, the influence of which must eventually prove to be very beneficial all round.

Pigraising Advocated.

Continuing, the Minister indicated that the output of butter in the State had diminished from 9,694,644lbs. in 1911 to 6,317,613lbs. in 1915; cheese from 1,526,930lbs. to 1,412,692lbs.; and cured bacon and ham, from 4,311,497lbs. to 2,432,485lbs. In the same period, the value of the dairy products had risen from £786,200 to £843,829 in 1915. Respecting the export trade, although in 1914-15 only 2 tons of butter was sent away, in 1916-17 the total quantity shipped had been 1,000 tons, which represented the second highest export for any one year. During the last year 31 tons of cheese had been dispatched. This was the first occasion on which cheese in any quantity had been exported, but it must be remembered that the position was due largely to abnormal conditions. To ensure a satisfactory export business, whether in butter, cheese, or bacon, it was essential that a continuity of supplies should be maintained. Simultaneously with the development of the dairying industry, he hoped to witness a marked expansion in pigraising and bacon curing. Every farm ought to carry a few pigs. At the close of the war an attempt should be made to work up with England a permanent trade in cured pork and ham, and possibly fresh pork. At present the Minister of Industry was formulating a scheme whereby the Government Produce Depot would take in the pork at a fixed price for export, and when it fell below that it would be prepared to store it. There was no wish to compete with the local bacon-curers; but, instead, it was desired to assist them to build up a permanent and satisfactory export trade. The Minister then emphasized the necessity for saving all heifer calves, especially those from good stock, and concluded—"This is no time for the go-slow policy. We must make progress as fast as safety demands. I regard this meeting as an indication that, so far as the dairying industry is concerned, there is not going to be any more of the go-slow policy. We are prepared to develop it to the utmost of our capabilities.

Factories in the Country.

At the instance of Mr. C. J. Tuckwell, seconded by Mr. A. W. Shillabeer, a hearty vote of thanks was accorded to the Minister. In reply, Mr. Goode referred to the intention of the Government to establish bacon and butter factories in the country. The Government had no intention to compete with private enterprise in the matter, but felt that, in the interests of the State, it could not allow the dairying business to languish for the want of local factories. The idea was to establish factories in certain districts, especially along the Murray, and then turn them over to the suppliers of the cream and milk to be conducted on co-operative lines. The Government was also considering the question of offering prizes for dairy cows at shows, and special opportunities for the use of selected dairy sires. In the latter connection he felt that it would be well to carry bulls on the railways at a reduced cost. In fact, it probably would pay to transport the animals free of charge, as the amount involved would be more than made up by the revenue from the increased quantities of produce which ultimately would be carried over the railways.

FROM FARM TO FACTORY.

Mr. A. Taylor (of the firm of Messrs. Taylor Bros., Gawler) contributed a paper, with the title "From the Cowyard to the Finished Butter." He said:—

The Cow to Buy.

Purchase the best cows your cash will permit, as a good dairy cow will not eat any more food than a bad one. A cow at about the second calf is a profitable one to buy. The Jersey is recommended as the best butter cow, but we have had some splendid Shorthorns. The latter are a good, hardy sort, and, as a rule, give good milk and butter yields. If the calf should be sold, it will bring a good price in the market, and when the cow has finished her milking days she will fatten up well and earn a good price from the butcher. The Shorthorn cow is generally quiet and good-tempered, a good doer, has nice teats, and is fairly easy to milk. Of course, one wants to be careful to get a cow with a nice even udder and teats evenly placed. When the cows have been selected it is advisable to obtain a well-bred bull, so as to try to improve the herd. A Jersey-Shorthorn cross is a profitable type to favor.

Feeding.

Cows always do better when allowed a change of paddock occasionally, as the feed then has a chance to sweeten and freshen up. A good plan is to have two or three paddocks and give them four or five days in each. The feed should not be allowed to get rank and strong, otherwise it will affect the cream. Some object to feeding cows while milking, but I have found that they always appear to be more contented and give their milk down more freely then. I strongly recommend feeding bran during the summer months—an ordinary dipper of bran (wetted with about a pint of water) morning and night every day. It acts as a physic, increases the milk supply, and improves the

quality of the cream. During my 23 years with cows I used bran, and I did not have a single cow die or suffer from impaction or dry bible. Cows want a good supply of clean water in the paddocks, and if possible in the yard, where they can always help themselves.

Milking.

When yarding the cows, always drive them from the paddock to the yard quietly, at a walking pace. Do not "dog" them in. When yarded let them stand for a few minutes before starting to milk. Every cow has her own position in the yard. Always start milking morning and evening at the same time. Milk each cow in rotation. Let each milker have a bucket of clean water with a cloth in his bail. Rinse the hands after bailing the cow, and wash the teats clean, as there is always a certain amount of dust or dirt about the udder. Wash the hands after milking each cow. It is cleaner for the milk, and prevents the spread of sore teat troubles. If a cow has sore teats, it is best to leave her until last. Sometimes when starting to milk, one nipple will appear blocked up. Put a gentle pressure on that teat, a little vaseline on the palm of the hand, and rub on the nipple gently. Possibly a white stringy substance will then appear. Work that out with gentle pressure; never put the finger nails against the nipple, as they may poison it, and possibly cause the cow to lose a quarter. If a quarter should get hard bathe it well in warm water and rub with soap, leaving the lather on. Sometimes a good rubbing with oil or vaseline will be effective. Always milk a cow fast, with a good, firm, gentle pressure. Do not pull the teats. Milk her right out, and let her go. Never illtreat her in the bail or out of it. Never use the milk of a freshly calved cow for at least five days, but give the milk to the calf. That milk often spoils a lot of cream. A few hot bran mashes are necessary for a cow just calved. If the after-birth does not leave within a couple of days, attention is desirable by an experienced person. Never use the milk of a cow that is unwell.

Separating.

So soon as milking is over, or if there are two or three hands, let one start separating just before the milking is finished. Keep the milk up to about 98deg. The machine makes cleaner work with the milk warm than when it becomes cold. Always try to have the milk the same temperature each time of separating, and turn the machine at the same pace. This will make the butter yield more even for each can. Do not put the separator together until you are ready to use it. When you start, run right through. Do not follow the milk with hot water, but put about half a gallon of separator milk through to rinse out any cream that may be left. Immediately afterward take the machine apart, rinse in separator milk, which makes it easy to wash, then rinse in cold water and finish with hot water. Dry all parts with a clean cloth and hang up in a well ventilated place. Always wash the separator after it is used, no matter how small the quantity of milk. Keep the cow bails swept clean, and the yard cleaned up every day; it is better for the milk and more comfortable for the men.

TREATMENT OF CREAM.

When cans come from the factory, scald them out well with hot water, place them on their sides with the lids off in a ventilated, airy place. When required for use, rinse them out with hot water, then a little lime in cold water, and finally rinse out with cold water. Be sure and have a clean vessel to receive the cream from the machine; cool the cream, and do not mix with other cream until following day Then when mixing, stir well every time. Have the separator set so as to run the cream about two to one—that is 2lbs. of cream to make about 1lb. butter, then a 5gall. can will give about 25lbs. of butter. Always keep a clean piece of cheese cloth over the top of vessels that contain cream, to keep out flies, blowflies, and mice. Never keep cream in a room with cheese, vegetables, or fruit; in fact, cream should have a room entirely to itself. Do not keep cream in a cellar in the winter, as it is too close and causes the cream to become mildewed and stale. In summer, always keep the cream as cool as possible. A good plan is to get a clean wheat sack, open it down both sides, and wet it well in cold water and wrap it round the can. This done morning and evening will keep the cream in excellent condition until you have sufficient to send to the factory. After sundown stand the cream outside (weather permitting, of course), and bring in again early in the morning. Send the cream at least twice a week to the factory, and always try to send by a morning train. In hot weather, for long distances, it pays to put a wet bag round the can of cream. The factories will always send the bag back. Thousands of pounds sterling is lost in South Australia yearly through careless handling of cream on the farm. The factory can never satisfy a supplier that sends inferior cream. Dairying properly managed and attended to is the best paying proposition any man can take on, and I would strongly recommend the Government to have a capable, experienced man to call on the farmers at their homes, and advise them how to improve the quality of their produce. To ensure a general improvement in the methods adopted by the suppliers provision should be made for complete inspection and education by Government officials.

In the animated discussion which ensued, the Government Dairy Expert (Mr. P. H. Suter) emphasized the necessity at all times for the cows being provided with a plentiful supply of clean fresh water. He felt that the time had come to ask the Government to introduce legislation which would ensure a general improvement on dairy farms and in some factories. He was convinced that if the second grade butter could be raised to first grade standard it would mean an additional revenue to the producers and the State of £50,000 per annum. Mr. J. Legg (Blakiston) said the greatest curse to the factories was the inferior quality cream. When a complaint was made to a supplier on this score, he immediately said, "Very well, I'll go to so-and-so; he'll take it." Government action was necessary. While the present unhealthy competition continued this difficulty would continue. (Hear, hear.) Mr. Frost (Yahl) submitted that cloths should be barred, and on no account should the use of preservatives be allowed. Mr. Lauter-

bach (Lauterbach Bros.) considered that the cream and the butter as well could be handled better on the railways. It was better to separate milk at a temperature of from 82deg. to 85deg. than at 98deg., which was too high. Numerous losses of stock had occurred in the Woodside district from so-called dry bible, but since the dairymen had been giving the animals plenty of bran, particularly in the summer time, the mortality had greatly diminished. Mr. Dickson (Petersburg) considered that what the dairyfarmers needed was education. Inspectors should be appointed to visit the farms and have power to take action where such a course was deemed to be desirable. Both the dairymen and the factories should be subject to effective legislation enactments. Some of the cream supplied under existing conditions was unfit for use, and had to be thrown away. Mr. Edwards (Government Factory) recommended the dairymen, while the cream was on the farms, to cover the cans with wire gauze instead of with cheesecloth. Mice ate through the latter, and he had found some of the rodents in cream sent to the factory. That cream, of course, had been immediately thrown out. Mr. Finlayson (Balaklava) said the best preservative for cream was cleanliness. (Hear, hear.) Mr. Clements (Gawler) said he was a heavy user of bran, but considered that crushed oats would be more profitable than bran for the average farmer to use. Some bran was highly indigestible, and he had had serious trouble with it. Mr. Shillabeer advised dairymen not to allow their cows to tackle lucerne, especially young lucerne, before the morning milking, otherwise the flavor would get into the milk and cream. Mr. Suter, who joined with the other speakers in complimenting Mr. Taylor upon the comprehensiveness of his paper, said milk should be separated as soon as possible after it had been taken from the cows. The temperature should exceed 86deg. Fahr., but be not more than 98deg. Under 86deg. would not allow of a clean separation. It was utterly impossible to make good cheese with milk or cream into which preservative had been introduced. So far as the supplying of inferior cream was concerned, the managers and proprietors of the factories had the remedy, to a large extent, in their own hands. All cream should be paid for according to the correct grade. Kale, lucerne, and other fodders undoubtedly tainted milk, but the chief trouble which the factories had to contend against was the stale flavor. (Hear, hear).

The Pig Industry of South Australia.

Mr. H. A. Monks (Littlehampton) contributed a very interesting paper on this subject. He said the pig was one of the most important animals we had in the State. First, it was the refuse or by-product consumer for the dairyman farmer and the gardener, and was the means of saving of a large percentage of profit. For human consumption fresh pork, pickled pork, ham, bacon, pigs' cheeks, lard, brawn, mettwurst, fritz, white and black puddings, sweetbreads, chitlings, and tripe were the products of the pig which the consumer enjoyed. The hoofs were of great service, for from these was made the finest glue. Pig hair was also of great value for the upholstering

of railway carriages, motor cars, and furniture. America was at present doing a large export trade in this commodity. The pig industry in South Australia had developed very rapidly during the last 15 years, and there were now between one and two thousand pigs killed every week in this State and manufactured into bacons and hams, whilst there was also a large number slaughtered for fresh meat purposes. There was a great future for the pig in South Australia, and in fact all the States of the Commonwealth, and it was one which deserved the whole hearted support of the Government. In order that the development of the industry could proceed more rapidly it was necessary to establish an over-sea trade. But in this connection there were certain regulations that would have to be observed. The clauses of the Commerce Act were very rigid, and few people were aware of what was required before the product of the pig could be placed on board ship. The Act demanded that the premises upon which the pig was slaughtered should comply with certain regulations, the live pig was required to be passed as being healthy, the carcass deemed fit for human consumption, and the cured meat also submitted for examination. The premises must be registered and numbered.

Government Assistance.

In order that the pig industry might progress and be kept in a healthy condition, it was necessary that the State Government should render it assistance, not from a financial standpoint, but from an educative viewpoint. He suggested that a qualified man should be appointed by the authorities to lecture before the members of the various branches of the Agricultural Bureau throughout the State and endeavor to educate the farmers and pigraisers as to the possibilities of the industry, the best means of breeding, feeding, and marketing pigs, the best types to keep, how to keep them, and the best time to market, so that they would present the greatest value from a bacon manufacturer's point of view. Pigs from 100lbs. to 150lbs. were the most profitable sizes to market, while those ranging from 120lbs. to 130lbs. were the most called for. Many people kept the animals too long, then sold them when they became heavier, but the extra weight did not realise proportionately. That was where the instruction of a lecturer would be of great value. If he were appointed for a period of two years he would in that time have done a great deal of good and would have materially assisted the industry. His services would be greatly appreciated by both the producer and the manufacturer. The overseas trade in frozen pork, tierce pork, green bacon, and prepared bacon would be considerably helped if information were given, as coming from the Trade Commissioner, as to the size and quality required for the English market. These were a few points which he thought would be of value in the development of the industry, and one which in the near future would be one of the most profitable in the State.

Mr. E. W. Mitton (Messrs. Sandford & Co.) thought it desirable at the outset to ascertain precisely what was required for export purposes. Mr. Monks replied that the practical man appointed would be

expected to possess a knowledge of those requirements. Mr. Apps (Assistant Government Expert) said a Victorian authority had informed him that the pigs required in the form of bacon for the London market should weigh from 200lbs. alive and dress 150lbs., thus providing sides which roughly went 56lbs. each. It was far better to export the bacon in the green state and allow the product to be treated when it reached the old country. Singeing, which gave the skin a smoother appearance and a nice, nutty flavor to the flesh, was necessary.

Mr. J. G. Murphy (Messrs. Murphy, Fromen, & Co.) then read a paper on Government Competition *versus* Government Assistance in relation to the Dairying Industry.

RESOLUTIONS.

Paying for Cream.

Mr. D. Hammond (Quorn) expressed the opinion that it would be advantageous all round if a uniform basis for the payment of cream were adopted throughout the State. He personally favored payment according to the percentage of butter fat, but another system took account of the amount of commercial butter produced. Mr. Suter mentioned that he proposed, when fresh dairying legislation was being considered, to move for the compulsory adoption of a uniform practice. Mr. Brice submitted that the fairest method was to test the contents of every can, and pay for the butter fat. Mr. Suter explained that the commercial butter content was the basis generally adopted, and he thought the best plan would be to continue it, as the farmers understood it. At the instance of Mr. Hammond it was decided that "a recommendation be made that it be compulsory for factories to pay for cream on the commercial butter basis according to O'Callaghan's chart, which provided for a 17½ per cent. overrun."

Government Instructors.

On the motion of Mr. Dickson, seconded by Mr. Finlayson, it was decided—"That this conference recommends the Government to appoint instructors and inspectors to visit the dairy farmers and factories."

Freights.

Mr. Finlayson proposed, and Mr. Edwards seconded—"That this conference desires to impress upon the Government the need for taking immediate steps to secure shipping space for butter during the coming season." This was carried.

Rail. Facilities for Dairy Products.

Mr. Dickson proposed, and Mr. Finlayson seconded—"That seven delegates be appointed to approach the Railways Commissioner with a view to providing better facilities for the conveyance of farm and dairy produce on the railways during the summer months." Messrs.

Dickson, Finlayson, Monks, Taylor, Brice, Mitton, and Frost were appointed, and waited on the Commissioner on Wednesday, June 20th, at 3.30 p.m.

In the evening the Dairy Expert (Mr. P. H. Suter) delivered an address; this will appear in a future issue.

AN ANNUAL CONFERENCE.

It was unanimously decided that, in view of the success of the gathering, the Government be asked to make the conference an annual fixture.

VISIT TO GOVERNMENT FACTORY.

On Wednesday, June 20th, the delegates journeyed to Port Adelaide to the Government Butter Factory. After a general inspection of the premises had been made, a number of samples of butters submitted for export were examined, and the Dairy Expert (Mr. P. H. Suter) dealt with the defects met with and the remedies to be adopted. Carelessness in packing, as evidenced by the dirty appearance of the papers and the presence of air spaces in the boxes, was the most noticeable trouble.

A SUITABLE FARM HORSE FOR SOUTH AUSTRALIA.

An address to the Mount Barker Agricultural Bureau by FRAS. EVELYN PLACE, B.Sc., M.R.A.S.E., B.V.Sc., M.R.C.V.S. (Government Veterinary Lecturer, South Australia).

The Mount Barker Agricultural Bureau, having done me the honor of asking me to express my views on the subject of the class of horse most suitable for farm work, have set a task that is not easy of accomplishment, and at best is only an expression of personal opinion on my part. It is by no means an easy task to lay down rules of selection for the lines of the most suitable horse for farm work; but, fortunately, Mount Barker is so situated that the horse most suitable for this district will not be unsuitable for any other.

So many factors arise to qualify various points that one has to bear them in mind and assess their relative value when breeding, and there is no doubt that the various breeds of draught horses owe their peculiarities to climate, the contour of the country, the soil, the atmosphere, and weather conditions in which they are reared, as witness the heavy breeds of Britain.

It is this series of facts which shows that this Branch is wise in discussing the subject, because the preponderance of two heavy breeds has somewhat blinded the breeder's eye to the advantages possessed by other breeds, and the necessity for breeding for the special conditions obtaining in South Australia. The growth of the two premier breeds of heavy horses in Britain proves this, and is highly interesting, for despite possible objections from some of my friends "frae ayont the

Tweed," their history goes a long way to prove that the Clydesdale and the Shire are but developments of a common stock, much intermingled as time has gone on, and yet remaining distinct under different climatic and telluric circumstances.

The Clydesdale.

To briefly outline the history of the Clydesdale, there was a hardy native stock to commence on, and after the union of the two kingdoms in 1603, a droving trade of a pacific character sprang up, resulting in the importation of English blood, selected colts and fillies, whose ancestors had, a century or so before, been imported into England from the Continent of Europe.

In 1750, or thereabouts, John Paterson imported from England a black Flemish stallion, and mated him with mares already at Lochlyoch, related to him, and from this strain comes the white always looked for in a Clyde. Somewhat later Yorkshire coaching blood was probably introduced. In 1827 the Highland Society set about fixing the present colors by prohibiting any but black bays or brown bays at their shows. But the introduction of Shire blood is by no means ancient history only, because in the seventies of last century "Tintock," the grandsire of "Lord Salisbury," was imported, and took prizes. The Shire mare "Old Brickhouse" also went north to breed Clydes, and Lawrence Drew bred "The Prince of Wales" to Shire mares, and ignored the Clyde stud book.

The Shire and Suffolk Punch.

The Shire is the heaviest of all British breeds, bred both in the Fenshires and the Midlands. His ancestors date back a thousand years as the Great Horse, the War Horse, the Old English Black Horse, the Strong Horse. Caesar appreciated them sufficently to send some to Rome, and in the middle ages a doughty knight in armor rode over 25st., and required a weight carrier: from such we get the massive frames and limbs of the Shire of to-day. Much as we owe to gallant Belgium to-day, we are also indebted in the past because she kept pure the race of black horses, so that the Romans derived the most powerful horses from Belgic Gaul, and the British bought them later when Alva's armies devastated the Lowlands.

The Suffolk Punch was derived from native stock early crossed with Norwegian blood, which also shows in the Norfolk trotter. The chestnut Suffolk has many good traits in his character, but will not stand too much criticism: his Norwegian ancestry was none too good, but strongly dominant. A warning to those who would rashly try experiments in breeding. I am not going to decry him, nor damn with faint praise, but he will not figure largely in my views of a suitable horse.

Conformation for draught differs in many points from that required for speed: but the old adage applies to draught and blood alike—"A good horse has many good, few indifferent, and no bad points." Granting this, we must consider the conformation of the draught, for good points in a horse are not matters of ideal beauty, but have sound mechanical reasons, likewise a sound mechanical objection can be raised for every bad point.

But our conditions in South Australia demand consideration of two propositions—Are we to demand strength as opposed to speed, or are we to look for strength combined with speed? An excellent climate, soil on the average fairly light, comparatively low hills or expanses of plain, all point to strength plus speed. There is no call for excessive weight, such as Lincolnshire requires; there is no call for fancy feather, such as shown at Glasgow or Islington.

The Type Required.

We are told that the Devon pack horse, the Cleveland bay, the Yorkshire coaching stallion are all extinct or practically so; else in any one of them we have the type of mare we want. But it is no good looking for the unobtainable. We must take the mares we have, many of them very similar to the breeds just mentioned, many of them, alas, very unsound, but the material on which we must work to arrive at a grade type suitable for our conditions, conforming to the following requirements:—Color: no good horse is a bad color, but whole coats, dark shades, and dapples are to be preferred. Such coats betoken sound constitution. Much white is a disadvantage here, where we have strong sun, the rays of light causing nervous irritability by striking on large white patches. And, starting off the mark, let us try to have black points: the white legs and hoofs occurring in so much fashionable blood to-day are not desirable. Height, 15.2 to 16.2: apparently a low type, but our conditions do not require a very big horse, and certainly not a tall one, a difference that will become apparent later. Temper, mild, but plenty of vigor and nervous energy. Head, fine and clean, a little on the small side for mares: the jaw broad, but not heavy: the nostrils wide and open, the muzzle firm and broad: the eye bright and dark, full and vigorous: the forehead full and broad between the eyes and tapering to the poll: the ears quick and fairly long, but without any tendency to droop: the neck medium in length, massive, and arching. The back straight and broad, the tail well set on, the ribs well sprung, the last one long, for shortness there gives a light leggy appearance, a fault in some Clydes: the hindquarters broad and long, low set, well packed, and thighs muscular, the gaskins or second thighs well developed and broad. The girth round the heart good, for the body is then deep, and the horse looks big: the breast broad and deep, the shoulder not too straight nor too sloping, a little heavy from a light horse point of view, and not so muscular as a Shire requires, for a long, quick step is necessary. The forelegs straight and strong, no calf knees: the muscles of the forearm long, strong, and broad on side view: knee joint broad and flat. Below the knee the bone should be short, flat, flinty, and clean, with tendons to match. Fetlocks large, and if hair or feather is present, it should be fine, long, and silky. Short, coarse, matted hair always indicates low breeding. Legs and feet must be sound and straight, a tendency to pigeon toe is preferable to a disher. Hoofs by preference black, for they are stronger, hard, and like rubber; better a little on the small size for the size of the horse. Wide, open, flat, weak feet are very undesirable. The hocks should be broad in front, wide at the side, and square set, not straight, neither should they be at all crooked. The pasterns of medium length

and clean, for South Australia a little tendency to shortness may be tolerated. The action free and pony like, *i.e.*, active and strong; the horse should walk four miles an hour easily. The following cardinal points are imperative:—Good feet, good legs, good walking action, robust constitution, size, soundness, and substance.

There is a tendency in France and America to gauge horses by weight, and it would be well to introduce some consideration of weight here, for the weighbridge is always handy. If one takes a 1,700lb. mare as a standard, the efficiency in work of a 1,450lbs. is 90%, that of a 1,200lbs. 80%. The heavier colts mature and sell earlier at higher prices. Heavier machinery can be used and less human labor.

The Percheron.

Having laid down the lines required, it may justly be asked, Where can sires to get such be found? In South Australia there are Shires and Clydes that may be used with judgment, and their offspring selected to found a type. But America and Canada, wanting the class of horse described, were more free from what, without prejudice, I may term British insularity, and they went to France for the Percheron, which, springing originally from the same Flemish stock as the Shire and Clyde, were crossed with two grey Arabs called "Godolphin" and "Gallipoli" (surely a token for Anzac farmers), and the result of careful Government selections and individual judgment has succeeded in producing just such a draught horse as South Australia requires.

I am indebted to Mr. Wayne Dinsmore, the Secretary of the Percheron Association, U.S.A., for interesting statistics of the breed in America, and find that over 60% of the importations into America are Percherons, Shires and Clydes coming a bad third and fourth. Six out of 12 international championships for best draught geldings have been won by Percherons. We generally consider Americans keen business men, and these figures speak for themselves.

England, too, is waking up, and frequently my veterinary colleagues on the western front speak in the highest terms of these horses, which are being sent to England in increasing numbers. I quote the following from an officer at the front:—

"If you get a horse of the Percheron type, he will do you justice. They eat less, and do themselves better. The features of the Percheron breed are:—Intelligent heads, firm ears, faces broad between the eyes, very near to what we know as the 'pony type.' They are cresty on top. The shoulders are of good depth and free from lumber, and have a very fair lay. Backs are short and wide, and loins strong. Quarters powerful and deep, a little round, perhaps; tails nicely up; ribs deep and round, and deep round ribs are desirable. Viewed sideways, the Percherons are somewhat punchy and good looking sorts, and from front and rear they are wedgy, firm, and wide. They have a leg set at each corner, and such legs are short and have a plentiful supply of bone. They have enough hair to give protection, and yet not enough to be a nuisance, and they are very free from cracked heels in these oceans of pure, unadulterated mud. In actual height they are not very vast, but in bulk (which is infinitely more impor-

tant) they are big, strong, and low, with weight enough to shaft a load. Short on top, they have bottom lines which cover a fair space of ground. They are quick and active, can start and stop a load on the nail. They walk with a good, square, swinging pace, and keep it up, and can trot on with nice clean, straight action. The Percheron can walk in front of his load at four miles an hour, and trot back empty at seven or eight, and it is a rarity to meet one in the sick lines. You may think I am over enthusiastic; but I started with a prejudice against them, and speak as I find them. I do not claim that Percherons are "super-horses," equine paragons, but I do claim that for their stature they are the most useful, active medium draughts I have met."

So much for a biassed Englishman's view. Compare his remarks, unknown to me when I wrote the above requirements, and I think you will find that the Percheron will fill the bill. At least one at Canowie has done so, if his grade progeny may be taken as a test.

It is all very well to speak *ex cathedra,* but one may reasonably be asked his reasons for his statements, and if I may be permitted, I would like briefly to do so.

The Mechanics of the Horse.

It is a matter of applied mechanics, and if I digress and become a little too technical for the average man on the land, I must ask your forbearance. The horse is a tractive motor, for our present purposes, and as such we must jettison preconceived ideas regarding points of beauty, and consider his mechanics.

The centre of gravity of a body is not its middle, but is drawn nearer to the parts which weigh the most, and in the horse is constantly shifting as he moves; but, speaking generally of the horse at rest, his centre of gravity may be found at the intersection of a vertical line that would be near the eighth rib and pass through the gristle at the end of his breast bone, and a horizontal line that might be drawn from the point of the shoulder to the lower part of the upper third of his thigh bone, the lines, of course, passing through his bulk. The weight of the horse's fore end is about one-ninth greater than the hind, and the position of the head causes the weight of the fore extremity to differ from the hind by some 20lbs.

Equilibrium in mechanics is the state of the body induced by the forces which destroy one another, or which are annulled by a resistance. The horse's body does not rest upon the ground, but is supported by four columns, the limbs. The plot formed by the lines joining the four points which touch the ground at rest forms the base of support; it is sometimes a triangle, sometimes a line, and may even be only a point. But whatever the form and extent of the base of support, it is necessary in order to obtain equilibrium that the line of gravitation meet the ground within this base; the equilibrium will be so much more stable as the base of support becomes larger, and the line of gravitation nearer the base. In other words, a heavy horse with spindle shanks and narrow chest will have unstable equilibrium. Instability of equilibrium gives the measure of speed, as the limbs are displaced with a greater rapidity to support the body; hence our draught horse must be deep in the girth and low on the leg.

THE LEVERS.

The levers of the body are the bones, and the power that works them the muscles. The volume of the muscles gives the measure of their force, their length that of speed, so our horse must have massive muscles on back loins and quarters, long ones on short bones in the limbs. The legs are the supports and natural motors of the body. They consist of large masses of muscle at the top, and diminish to jointed columns of skin and bone as they go down, an arrangement which disseminates and attenuates the combined actions of weight and velocity, for if they were clothed with musele right down, as in the elephant, their weight would be excessive, and the step heavy and slow, because of the size of the limbs and the lowering of the centre of gravity. The forelegs are a little in front and close to the centre of gravity. Their principal work is to support the body, and disperse concussion. As propellers they only come into play in moving a heavy load at a slow pace, when the forelegs slanting backwards give a push at the collar, a trick mechanical motors have not yet learnt. This is brought about by the extension of all their articular angles when the toes are fixed into the ground, as may be seen by the slide a horse gives if the ground at this point of support gives way. The mechanism of the front legs as a means of support is admirably arranged from the point of view of conservation of energy; they sling the body by their muscular attachments, they support it at rest by their arrangements of bones, ligaments, and tendons.

The hind legs are built differently. They do less in support of the body, and are joined firmly by a bony joint to the bones which form the main column of the backbone. By the movements of their different segments they push against the trunk, communicating force or speed by the obliteration of their angles. As the muscles have to contract to oppose the closing of the angles of locomotion, they are bigger and more numerous than those of the forelegs, and while doing their duty as supports, their main work is to propel. They act with most ease and power when their line of direction points obliquely downwards and backwards. The muscles and tendons of the hind legs are so arranged that one articular angle cannot be extended without at the same time opening all the rest, producing a process of force accumulation, which, when exaggerated, is seen as stringhalt, when wanted for support, gives us the attitude of the foundered horse. This sketch of equilibrium will naturally bring to our mind's eye the proportions of the horse, and men have often tried to give, by tape and callipers, measurements that should enable any mechanic to be a good judge of form. They have failed, for they lose in isolated details the general sum which a good judge of a horse works out by his trained eye. But the task is not insuperable, and may one day be accomplished, as certain measurements in the sketches tend to show. The mechanics of the limbs is too intricate a subject to enter upon to-night, but it may be noted that the difference in the action of the shoulder in the blood or draught depends not so much on different formation as upon the upper angles of the limb being more open in the draught, because of the greater rigidity of the limbs required in pulling. Our draught horse does not require lumber on his shoulders, but shorter and there-

fore relatively stronger muscles than the blood. The judge applies these principles by estimating the closure of the angle of the shoulder by its height and slope. And he judges the angle of the hip by the straightness of the croup. He unconsciously estimates the relative values of the angles of the lower parts of the limbs from these.

When a man sets out to build a motor, the vehicle upon which the engine is mounted has to comply with certain conditions of height, length, and width. The same relationship applies in the case of the horse, only Nature lays them down instead of the engineer.

The height of the horse as usually measured at the withers teaches useful lessons. A lowering of but fractions of an inch at the withers brings more load on to the front legs; hence the advantage of a horse being cresty. A lowering of the croup results in over strain of the hocks; hence the frequency of bog spavin in certain fashionable breeds. The sum of the height is composed of the factors of body and legs, and if they are not accurately adjusted, our machine may go badly wrong; 17.2in., mostly daylight, is not as strong as 16.2in., mostly muscle. The length, judged by a line from the hind angle of the blade bone and the angle of the haunch, is usually the length of the head in a well-formed horse.

If we vary the height of a well-formed horse without altering the relations previously existing between his body and limbs, he at once seems too short: the centre of gravity has been raised without enlarging the base of support. The body will overweight the legs, which will have become longer without increasing his speed, because he will overreach. We have a locomotive unstable in equilibrium, weak in its parts, made taller to go faster, and failing to do so because of imperfect adjustment. A narrow, tall, forging, stumbling weed. We get on better if we lower the height, but our motor becomes massive and slow, and conditions in South Australia require a fairly speedy one; hence the height of our horse should be in the girth of his heart measurement. Width, of value in the draught, can be overdone, but practically seldom is, for depth and width mean much heart room, robust lungs, and lots of room for dinner or a foal.

The limbs must be in proportion, for large wheels moved by a strong crank are no good to a locomotive if its boiler and piston are incapable of moving them; while, on the other hand, the best of bodies is powerless with weak, ill-adjusted wheels; without force, without solidity, without speed, it will soon wear out, be it horse or motor. The fault can be checked, for between girth and pastern in an ordinary beast will be a head's length; a little longer in a large horse, a little less in a small one.

William Shakespeare, the butcher's boy, or Bacon, the mathematician, had not looked on a horse in vain when one of them wrote—

> So did this horse excell a common one,
> In shape, in courage, color, pace, and bone,
> Round hoofed, short jointed, fetlocks shag and long,
> Broad breast, full eye, small head, and nostril wide,
> High crest, short ears, straight legs, and passing strong,
> Thin mane, thick tail, broad buttock, tender hide.
> Look, what a horse should have he did not lack.

COMMONWEALTH ADVISORY COUNCIL OF SCIENCE AND INDUSTRY, MELBOURNE.

INDUSTRIAL ALCOHOL. A SUBSTITUTE FOR PETROL.

The question of finding some substitute for mineral oils as a fuel has attracted a considerable amount of attention in various countries in recent years. Already the price of petrol in Australia has increased from 1s. per gallon in 1908 to 2s. 7d. in 1917, and if the war continues there is a prospect of a serious shortage of petrol in this country, if not even of a complete cutting off of the supply. Even if the war ends soon the supplies of mineral oil are practically stationary, while the world's demand is increasing rapidly. As there are no payable oil fields in Australia the question is of importance and urgency.

In April last the Commonwealth Advisory Council of Science and Industry appointed a special committee of experts to inquire into the production of industrial alcohol in Australia, and the design and manufacture in this country of engines suitable for using alcohol in place of petrol. This committee has now issued its first progress report. The committee draws attention to the fact that alcohol possesses various advantages over petrol as a fuel. In the first place the products of combustion in an alcohol engine are practically odorless and free from smoke. Secondly, the risk from fire in storing and handling alcohol is much less than in the case of petrol. Thirdly, there are many theoretical, chemical, and physical reasons why alcohol should yield superior results. It can be used without danger of pre-ignition under high compression, and it can yield a much higher percentage of its available heat contents in the form of work. Lastly, alcohol is produced in Australia, and, if necessary, can be manufactured here in largely increased quantities.

The main aspects of the problem that have to be solved are (*a*) The design and manufacture of the engine; (*b*) The supply of alcohol and its distribution; and (*c*) The denaturation of the alcohol, so as to render it impotable.

The engine problem does not present any serious difficulties, as alcohol has been used for a number of years with success in other countries, notably Germany. The main difficulty is that alcohol engines cannot be started from cold, and some special device for pre-heating is necessary. The committee is taking steps either to purchase or have constructed an engine or engines and to use them for demonstration purposes.

The supply of alcohol is a much more difficult problem than its utilisation. At present the cheapest source for the production of alcohol in Australia is sugar molasses, but even if the whole supply of molasses were used it would be sufficient to produce only about 4¼ million gallons of alcohol, whereas the annual importations of mineral oils are about 17 million gallons. If petrol is to be replaced by alcohol it will therefore be necessary to use some source in addition

to, or in place of, molasses. If alcohol cannot be profitably made from waste or raw materials not at present used, such as prickly pear, sawdust, and waste timber, grass trees, waste fruit, and vegetable refuse, it will be necessary to grow special materials for the purpose. The most likely of these are maize, potatoes, wheat, barley, and beet. The committee is investigating the cost of production on a commercial scale of alcohol from various sources.

The denaturation problem also presents considerable difficulties. Under the present Excise regulations alcohol has to be mixed with other ingredients to render it impotable before it can be sold as methylated spirits. If alcohol is to come into general use as a fuel it will be necessary to find some cheaper denaturants than those now used; otherwise the Excise regulations will make the price of the fuel too high. If these difficulties are met in a liberal and progressive spirit there is no doubt that they can be overcome. When this is achieved, not only will Australia cease to be dependent on other countries for a fuel which is essential, but many new industries will open out both directly and indirectly as a result of the change. From the Imperial point of view it is important to secure uniformity in regard to denaturation, so that industrial alcohol distilled in one part of the Empire may be exported for use in other parts. With this object in view the committee is co-operating with the Imperial Motor Transport Council, London.

The committee inquiring into the question will be glad to hear from persons who are interested in their work, and will be pleased to make available all information in their possession. Communications should be addressed to the Secretary the Commonwealth Advisory Council of Science and Industry, 314, Albert Street, East Melbourne.

POTATOES FOR PIGS.

Pigs do better on boiled potatoes than on raw, which sometimes set up indigestion, but the water they are boiled in is not good for them, owing to the potash in it. However, if grain, or pollard, or bran is boiled with them, then the whole can be given them together with advantage.—F. E. PLACE, B.V.Sc., M.R.C.V.S.

PHYLLOXERA AND AMERICAN VINE STOCKS.

THE ARGUMENTS FOR AND AGAINST THE ESTABLISHMENT OF A NURSERY FOR PHYLLOXERA RESISTANT STOCKS IN SOUTH AUSTRALIA.

The question of the protection of South Australian vineyards against a possible invasion of phylloxera received a good deal of attention at the Conference of River Murray Branches of the Agricultural Bureau, when Mr. H. S. Taylor introduced the question on behalf of the Renmark Branch, and Professor A. J. Perkins gave expression to his views on the matter.

At the previous Conference, the following motion had been tabled:—"That this Conference, having in mind the difficulties experienced in Victoria in obtaining sufficient phylloxera-resistant stock for the reconstitution of their vineyards, urges that steps be taken by the South Australian Government or the Phylloxera Board to ensure, against the time when it shall be needed, an abundant supply of resistant stock of varieties and hybrids of probable adaptation to the river soils, and of proved affinity with the scions of European varieties required for wine-making, and especially for drying purposes. We urge therefore that early steps be taken to establish a nursery for phylloxera-resistant stock under conditions that will obviate any possible danger of the introduction of phylloxera to the State by this means, and to this end suggest Mildura as a suitable site for this purpose, Mildura being a phylloxera free district, and resistant stock having been established there for at least 12 years."

At that time consideration of the question was deferred, and Mr. Taylor was requested to supply a paper, setting out the views of the Renmark Branch on the matter. The position taken up by that Branch, he explained, was that they did not want South Australian vinegrowers ever to be in the same position that Victorian vinegrowers were in for many years—their vines destroyed by phylloxera, and they unable to replant their vineyards because the supply of reconstituted vines was so far short of the demand.

The Policy of Isolation.

South Australian vinegrowers were certainly indebted to the authorities, and particularly to Professor Perkins, he said, for the policy of exclusion which had kept their vineyards unphylloxerated for so long, but the pest would sooner or later invade the State, and it was open to discussion whether the policy of refusing to lay down a nursery of resistant vines was a wise one. Sixteen years ago, with phylloxera rapidly spreading throughout Victoria, and the prospect of Mildura being linked by rail with outside parts, the Horticultural Society there decided to establish a nursery of resistant vine stocks, moved by a desire to test the adaptation of different American stocks to

Mildura soils, and the affinity of those stocks to popular local vines. That was done, and after 15 years with American vines in its midst, Mildura was still free from phylloxera.

He explained that whilst American vines were all more or less resistant of phylloxera, they were far less tolerant of variations in soil than were the European vines. The recognition of these facts had led Mr. F. de Castella to say that it was only by experimental work in each locality, extending over a series of years, that the true value of any stocks for any given locality could be accurately determined. Mr. Taylor laid special emphasis on the marked effect of variations of soil on the choice of American stocks, and mentioned the experience of other countries, and their applicability to South Australian conditions. It might be well argued, he said, that experimental stations for vines for American stocks should be established in all vine-growing districts in South Australia.

The Supply of Stocks.

It had been stated that private nurseries in South Australia would very quickly produce all the stock needed by South Australian growers, but such a matter should not be left to private effort, except under strict Government supervision, aided by a Government subsidy. Unless growers were to be unfairly handicapped, they should be supplied with worked resistant stock at something below the cost of production, and the accumulated funds of the Phylloxera Board might be better employed, where the necessity arose, in making available reconstituted vines at a cheap rate, rather than in a too long expenditure on carbon bisulphide.

Whilst the American vines were resistant to phylloxera, they were not necessarily free from it, and the introduction of infested stocks, resistant or non-resistant, would speedily lead to the spreading of the insect. To eliminate the risk, it was suggested that cuttings should be obtained from Mildura. The collection available there was certainly incomplete, but would be worth starting with; but the addition of other varieties of good repute, properly treated, and raised in some isolated place until proved free from infection, would greatly add to the value of any nursery that might be established.

It was argued that if there were vines planted on resistant stock in a district, phylloxera might exist on the roots of these vines, and there would be no means of detecting it. But the disease was no more likely to be introduced on American than on European vine stock, and if the disease did come, the man who had planted portion of his vineyard with resistant stock would at least have the satisfaction of knowing that that part of his investment was safe.

If phylloxera existed only on the roots of the resistant vines it would do no harm, and if it spread to the adjacent vinifera, as of course it would, it would be detected there just as soon as though there were no resistant vines in the district.

The argument against the introduction of clean resistant stocks rested on the assumption that in future the measures to prevent the introduction of the disease would be as successful as they had been in the past, and on the belief that the reconstitution of vineyards was a

last desperate resource not to be adopted until all other methods had been exhausted. With regard to the first, South Australian growers had no guarantee of immunity for the future. Ignorance, thoughtlessness, and possibly even malice had to be reckoned with. As to the second, Mr. Raymond Dubois had stated:—"Phylloxera eradication, and even localization, had failed in every country: it would therefore be sheer folly to establish new vineyards in Victoria, or near infected areas, except on phylloxera-resistant stock, as this method alone insures permanency." Mons. P. Viala (Inspector-General of Viticulture in the National Agricultural Institute, Paris), stated:—"All other processes or methods of combating phylloxera can only be of transitory value, and only prepare, more or less progressively, the way for reconstitution with American vines."

Palliative Methods.

Out of 6,000 methods suggested to the French Government as effective means of coping with phylloxera, only four gave any promise of practical value. These were summarized as submersion, planting in sand, the use of insecticides, and the reconstruction of vineyards on American stocks. The first two were found to have only a very limited value. The use of insecticides gave greater promise of success, as it was found possible to hold the disease in check by means of annual injections in the earth of carbon bisulphide, or the use of sulphate carbonate of potassium. Immense sums had been spent in the bisulphide and extinction process; the cost in Victoria, it was said, amounted to £50 an acre for all vineyards treated. In New South Wales the figure reached £300 for every acre affected by phylloxera. Victorian legislation of 1880, 1881, 1890 gave the Minister power to direct the destruction of all vines growing in an affected vineyard, or within a three-mile radius of any diseased vineyard, and replanting was prohibited for four years after the uprooting of the old vines. It was not for 15 years after the discovery of phylloxera that these measures were abandoned and the importation of American stock sanctioned.

In France it had been recognised that the reconstitution of the vines, since recognised as the general and definite solution of the problem, was kept back by the prohibition to import vines in regions not then contaminated. M. Gustav Foex (Inspector-General of Viticulture, France) had stated that the use of cuttings of American vines without heel could have been authorised, under supervision, without incurring any danger. In that way, he continued, reconstitution would have been more rapid, and they would have avoided the period of great decrease in their production.

The Risk of Fungus Diseases.

Another of the contentions of those opposed to the introduction of American stock was that there was the risk of introducing certain fungus diseases, chief of which were the downy mildew and the less-destructive black rot, hitherto unknown in Australia. Downy mildew was last year recorded for the first time as appearing in Victoria. The outbreak did not appear to have been a serious one, and fears for its

recurrence, except under similar unusual conditions of humidity, were not entertained. Californian experience justified the belief that South Australia's summer conditions were sufficiently dry to prevent the more serious fungus diseases establishing themselves.

The Case of Switzerland.

Switzerland had been quoted as an example of a country in which methods of extinction had been successfully adopted; it would be quite a mistake to infer from that that Swiss viticultural conditions to-day were analogous to those of South Australia. The Swiss Government sanctioned the reconstitution of vineyards with American stocks in 1896, in consequence, it was alleged, of the very limited success of the costly annual treatments involved in the attempts at extinction of the phylloxera. But a Swiss State Nursery of American vines was established as far back as 1889, and a French writer could say, in 1899—"There are now State nurseries for the propagation of American stock in almost every canton."

Mr. Taylor then quoted at length from Mr. de Castella's second progress report on viticulture in Europe, as a fairly recent and authoritative statement of the Swiss position, and also from a report by the State Viticulturist for South Australia (Mr. H. E. Laffer) of a "Phylloxera investigation" made at Rutherglen two years ago. (*Journal of Agriculture*, 1915.)

At the conclusion of the paper, Mr. Taylor moved—"That this Conference recommends to the serious and sympathetic consideration of the Phylloxera Board the establishment of a nursery of phylloxera-resistant vinestocks for the future use of South Australian vine-growers." (The full text of Mr. Taylor's paper has been published by him in pamphlet form, and may be had on application to him at Renmark).

Mr. A. E. Ross seconded the motion *pro forma*, but he thought the Conference ought to hear Professor Perkins on the subject before they did anything in the matter.

The Director of Agriculture's Opinion.

Professor Perkins, who, on rising to speak, was received with applause, said that he congratulated Mr. Taylor on the preparation of his paper. He had in past years given that question a deal of thought, but had not had to deal with it much of late years. He still, however, adhered to the previous conclusions he had arrived at. He had listened to arguments similar to those of Mr. Taylor for the last 20 years, and he still held there was no reason for altering their practice in South Australia.

The Danger Point.

There was no danger, he thought, of an outbreak of the disease on the river settlements, and until the disease broke out at Mildura he did not think they need have much concern. If there was a danger at all it would be in the smaller vineyards round about Adelaide, which were in communication with outside districts. Had Mr. Taylor adhered to his original resolution, it would have been asking the Board to do something for the benefit of the river settlements alone, and to

do that would have been of little use to the rest of the State. In his opinion, the Board could not use its funds for a special purpose or a special district; but the widening of the resolution had done away with that objection. Mr. Taylor had dealt historically with Mildura, and had quoted from Mr. Dubois's letter to show that vines should be grafted on American stocks. But in Mildura there had been no resorting to that idea. In France the introduction of American vines had doubled the expenses of the grower, and so one could not expect growers to adopt the practice except under compulsion, and the result would be that in South Australia there would be no one who would differ from the Mildura precedent. Indeed, they would be the first country in the world, if they did this, to bring in the cure before the disease was present. There was a strong reason why American vines should not be brought to a clean country or a clean district. Mr. Taylor's argument might suit the individual, but what of the others? An enthusiast might adopt the idea, and have half his vines on American stocks, but the Board could not be expected to spend its funds for the benefit of individuals. Suppose the disease appeared locally, and a grower had half his vines grafted on American stocks. He would still have the phylloxera, and what would they do? Would they destroy the vines because they had the disease? They would not destroy them because they were going back, but because they would be a source of danger to the other growers. It was pointed out by Mr. Taylor that one had to examine the roots of the American vine to discover whether they had the disease or not. Then what was the use of the American vines to the growers? They would have to be destroyed in any case. He added that American vines could be grown from seed if the growers desired to do so.

Downy Mildew.

Professor Perkins went on to say that steps had been taken in Victoria to isolate Mildura from the outside districts, and this was a refutation of Mr. Taylor's argument in regard to the absence of downy mildew in Mildura. But Mr. Taylor had to admit that an outbreak of downy mildew had occurred in Victoria, though he made light of the fact; but there were quite enough summer rains in some of their districts to render downy mildew a troublesome disease to growers, and they would have to spray with Bordeaux mixture two, three, or four times a year. It was a very serious disease, as it might destroy a crop late in the season. He had seen vineyards where there was not a leaf left on the vines, and he might add that the disease spreads like a fire. Downy mildew had broken out, and they would have it again, and it would cause increased expenditure. Mr. Taylor had said that black rot was not so dangerous a disease. As a fact it was more dangerous, in that it attacked the fruit, and was not easily controlled. There were quotations of another kind made by Mr. Taylor from others in regard to checking the disease. But if they analysed these opinions, they would see that they referred to districts where they already had phylloxera. They had to bear in mind that no one was infallible, and he would be sorry to be one to agree to the admission of American vines into the State. They had to remember that if they

could sterilize vines the work was in the hands of men, and men were not infallible. Mr. Taylor had quoted from Mr. Viala, of whom he (Professor Perkins) had been a pupil; but his remarks were applied to a country under different conditions from those of South Australia. He had himself visited Tunis, where phylloxera had recently occurred, and there they were not introducing American vines, but were dealing with the disease under European conditions. Their own vines represented a million pounds, and it was a question of whether that was worth saving or not. Mr. Taylor had quoted Rutherglen, where they had introduced American vines, and the place had been ruined. As a fact they had in Victoria kept back phylloxera for 25, not 15, years, as stated by Mr. Taylor, and in Rutherglen they had, when the phylloxera occurred, ceased their checking efforts, and had introduced the American vines. His argument against the Victorian Government was that their efforts had been puerile and ineffective. But in South Australia, with their isolated vineyards—so different from Europe—they could combat the disease. If the disease occurred in Waikerie to-morrow he did not think that in the lifetime of any of those present it would be necessary to introduce American vines. Mr. Taylor had instanced the high cost of eradication methods, reaching, he stated, up to £300 per acre treated in New South Wales. But what of that? Suppose in the course of 20 years they spent £5,000 per annum in destroying 100 acres of phylloxera invaded vines. That would represent a total of £100,000, or £1,000 per acre. Now, what was £5,000 relatively to the capital value of South Australian vineyards? They had about 30,000 acres, which in the aggregate should in his opinion have a value of about £1,000,000, and £5,000 was only ½ per cent. on that sum. He was not inferring that they should necessarily spend £5,000 a year in combating the phylloxera. He merely wished to emphasize the fact that cost per acre as indicated by Mr. Taylor was no argument against the wisdom of fighting the phylloxera whenever it appeared. He complimented Mr. Taylor on the case he had made out, but, personally, he could not subscribe to it, and he would add that, from the point of view of the State, there was nothing to be gained by its adoption.

Mr. Taylor, in reply, said that he had taken the matter up for the Renmark Branch of the Bureau. Professor Perkins had placed his finger on the weak spot when he referred to the outbreak of downy mildew. He could not, nor could any of the members, decide what should be done from the point of view of Professor Perkins. He had quoted from numerous experts, and there he had to leave it. But he argued that what they wanted was to have at hand stocks ready to plant if the disease did break out, as was the case in Switzerland.

Professor Perkins—But not until after they had kept it in check for 40 years. We have not got the disease here.

Mr. Taylor—But I take it your argument is that we should not import American vines even after we have the disease?

Professor Perkins—That is so.

In reply to a question, Professor Perkins said that phylloxera first broke out in Victoria in Geelong in 1873. The disease did not live in the ground after the vine was destroyed; but he would instance cases

where they thought the vines had been destroyed, but men had had to go over the ground with ploughs afterwards because it was found the vines were again springing up. He was against the suggestion of Mr. Laffer to establish a nursery on Kangaroo Island, as, though the place was isolated, there was always the danger of persons bringing the disease over. He held that it would be time enough to talk about the nursery when the disease came here. Why the growers were thinking that local nurserymen could not produce sufficient rooted vines he could not understand. Private enterprise was doing the work in other countries, and he thought they would rise to the occasion in this State.

Mr. Quinn said that as a member of the Phylloxera Board he had occasion to follow the question closely. The value of the repressive measures that had been taken in Victoria was nil. He had seen kerosine poured over the vines in Goulbourn Valley under Government supervision, and was assured, in not very good English, that "the kerosine would go right down to ze roots of ze vine." Mr. Quinn instanced several cases of gross carelessness in Victoria. There had been no check on the distribution of vines from one part of Victoria to another after the outbreak in Geelong. In regard to the suggested nursery, he pointed out that they could not get all sorts of soils and climates in any one district, and to carry out the idea of Mr. Taylor for an instant replanting they would have to have experimental vineyards in every district.

Mr. Taylor—That is so.

Mr. Quinn said that Victoria said they could not get sufficient grafting wood, but he was sure that they could quickly establish a mother vineyard, and in view of the slow growth of the disease, they would have ample time to cope with it.

Mr. Taylor, in conclusion, said that in fairness to Professor Perkins he ought to say that in California Professor Wickson now said that it was doubtful whether it was advisable to use resistant stock until they actually had the disease.

On the motion being put it was declared lost.

The flesh of a sow killed in heat is not likely to cure well, as the constitutional upset is somewhat similar to fever, and therefore the flesh is likely to be soft and not set, says Mr. Place. It is an easy matter to evade killing at that time, as the symptoms of heat in a sow are distinct.

DOWNY MILDEW IN VINES.

RECONSTITUTION IN NEW SOUTH WALES.

A Report by the Viticultural Instructor and Lecturer (Mr. H. E. LAFFER).

For the first time in Australia the disease known as downy mildew of the vine (*Plasmopara viticola*) has been identified in the vineyards of Victoria.

The infected area is situated in the north-eastern portion of the State comprising the Rutherglen and adjoining shires bordering on the River Murray at Wahgunyah, and the fungus has been discovered during the past season on a strip of country roughly 400 square miles in extent. This points to the fact that the outbreak is not the result of one year's infection, but rather that it has been present in the incipient stages for at least several years.

Climatic conditions prevailing up to the 1916-17 season have been of such a nature as to check the disease before the development of conidiophores could take place, and therefore reveal the nature of the trouble. In all probability there has been for several years a slight development upon the leaves of the vines, but not sufficiently marked to attract special attention.

The past season, owing to the prevailing weather conditions with frequent summer rains, enabled a further development of the fungus to take place, and the characteristic sporulation on the under surface of the leaves left little doubt as to its origin. To be perfectly sure, however, specimens were submitted by Mr. Castella (Government Viticulturist of Victoria) for pathological examination, and his diagnosis was subsequently confirmed by the micro-biologists.

Although the importation of this disease into Australia is to be regretted, it was in a sense only to be expected that sooner or later it would appear. Victoria and New South Wales have imported large numbers of grafted phylloxera-resistant vines from Europe within the past 10 years, and the disinfection that would effectively sterilise them of all resting spores of fungoid diseases would necessarily be next to impossible.

Although it is by no means definitely established that the present outbreak can be traced to these vines, yet it would appear only reasonable to suppose that such is the case. The alternative supposition, that the spores were introduced upon imported raisins, is but a remote possibility.

As already stated, the infection is spread over a large area, but so far as Victoria and South Australia are concerned, I am inclined to think that the outbreak need not be viewed with any great feelings of disquietude. Climatic conditions prevailing during our summer in the great majority of seasons will prove an effective check on any

serious development; but at the same time it would be foolish to overlook the serious possibilities attaching to an outbreak of the disease even in South Australia.

I do not propose in this report to deal with the complicated life history of this particular fungus, but it may be briefly stated that the presence of free moisture upon the foliage of the vines is absolutely essential to the development of the spores, and also that moist humid conditions are demanded before sporulation by conidiophores can take place.

It is many years, until the present, since the States of Victoria, New South Wales, and South Australia have experienced a season so favorable to the development of cryptogamic pests, particularly downy mildew and anthracnose (black spot). Further, it may be just as many before we again see conditions equally suited to their growth.

If then, as has proved to be the case, downy mildew has not been sufficiently severe to do any appreciable harm under existing conditions it may be taken as granted that in normal seasons its effects will be almost negligible. Indeed such has been the experience of North Africa, where climatic conditions are somewhat similar to our own.

An Important Aspect.

There is one aspect of the trouble which must however be taken into consideration. Although the disease has without doubt been present for some years in Victoria, never before has there been the development of the myriads of spores such as will be released in the present autumn. These spores are capable of transit over great distances through the agency of the wind, and will provide the means of a more intense infection of the young growth next spring.

The present development came somewhat late in the season, attacking fairly mature growth, and at the same time missing the most fatal aspect of the whole course of the disease, namely, the attack upon the fruit. It remains to be seen whether in the early stages of growth next year there is going to be any serious attack upon the young foliage. If such is the case, then it is possible that the injury done to the young growth will be reflected upon the vigor of the vines in general, and possibly some hold may be obtained upon the fruit bunches.

This, of course, presupposes that no preventive action is taken; but it is safe to assume that growers within the infected areas will adopt all recognised means of preventing the development of the spores upon the young growth of the vines. Timely treatment with effective fungicides, coupled with adverse climatic conditions, should in a measure minimise the danger arising from what represents one of the most destructive diseases affecting the vine in Europe.

During my visit to Rutherglen, in company with Mr. Castella, I had the opportunity of viewing downy mildew in a number of vineyards, the principal of which being the Viticultural Nursery, Messrs. Ireland's and D. Smith's at Wahgunyah, the Viticultural College, and Mount Ophir. The disease was discernible almost everywhere, but the amount of sporulation was not very great. It was remarkable to

observe how the proximity of even small sheets of water, such as a dam or drain, influenced the development of conidiophores. Frequently not observable in other parts of a vineyard, it was always to be found under the conditions referred to. Naturally the worst infection was in the near vicinity of the River Murray or its back waters; and at the State Nursery, where considerable irrigation is carried on, it was particularly noticeable.

This fact raises the question as to what damage might be done within the Murray Irrigation Settlements; but I am inclined to think that even with intense irrigation, the atmospheric condition of these areas is too dry to cause any uneasiness.

So far as I was able to ascertain, there has been so far no development of the disease outside Victoria or beyond the area referred to. The nearest vine district to it is Corowa, in New South Wales, immediately across the river from Wahgunyah, and this might reasonably be expected to show signs of its presence within a short time. Further along, in the Albury district, there are no indications of downy mildew having put in an appearance. These districts, like the north of Victoria, are too dry for the fungus to do any great amount of harm in ordinary seasons.

It may be considered rather remarkable that downy mildew has not been discovered in New South Wales, for within recent years considerable numbers of vines have been importd from France for the purpose of replanting vineyards destroyed by phylloxera. Possibly it may be due to the fact that spraying of the young vines has been attended to with a view to preventing any possible outbreak of fungoid disease.

Under the guidance of the Viticultural Department of Victoria the specified treatment for downy mildew has been, and will continue to be adopted, and we may safely assume that the disease will be held in check by these remedies and adverse climatic conditions. The spray being used is the 6-4-30 formula of Bordeaux mixture. Every effort will, of course, be made to check the spread of the fungus by other than natural agencies, and against these we have no control.

The presence of downy mildew in Australia is a matter to be regretted, even assuming that it does but little harm under our normal conditions of summer temperature. In any case it will necessitate constant watch and the application of spray mixtures to keep it from developing in the localities where it has been observed. At a rough estimate it may be taken that the cost of treating vines will not be less than £1 per acre, representing a considerable increase in the cost of maintaining a vineyard.

It serves to demonstrate the danger resulting from the wholesale importation of foreign vines, and at the same time affords an object lesson of which South Australia might take advantage.

Reserves of American Stocks.

I have in the past advocated the establishment of reserves of the American species of vine, which have proved themselves of value as stocks to the vinifera. Such reserves could be established in a quaran-

tine area such as Kangaroo Island, the necessary cuttings to be obtained from one or other of the clean districts of Victoria or New South Wales, of which there are several free from the disease.

It is freely conceded that the risk of introducing phylloxera upon ripe vine cuttings is very remote, and given proper sterilisation, that risk should be completely eliminated.

The fact that the problem is now further complicated by the presence of downy mildew within Australia, in my opinion, makes it even more imperative that a start should be made from clean stocks.

It is scarcely reasonable to suppose that South Australia is never going to have phylloxera in its vineyards, nor is our experience with regard to its extermination going to be different from that of every other vine-growing country which has been attacked by it.

If the matter is delayed until we discover that South Australian vineyards are phylloxerated, then there will be immediate necessity for introducing resistant vines in large numbers from either Europe or the Eastern States. In all probability the latter would not be in a position to supply the vines, and they would have to be drawn from Europe, risking the almost certain introduction of other pests as well as obtaining inferior results in the percentage of growths.

At the present time, cuttings of all the main resistant species can be procured from Victoria, where some districts, such as Mildura, are still free from both phylloxera and mildew. It is a reasonable possibility to sterilise cuttings even from the latter, but it may be said to be impossible to effectively sterilise large numbers of rooted vines.

As South Australia is one of the few States which has so far not suffered from phylloxera, so it is one which has the opportunity of initiating a policy which will enable us to avoid the mistakes made by other countries. Other countries have had their vineyards destroyed before any effective work in reconstitution has been done, mainly because lack of information on the subject has prevented a thorough grasp of the situation.

With all the experience of other countries in the matter of stocks, South Australia should be prepared to start replanting as soon as existing vineyards begin to die out. The area under production then can be maintained and stocks of wine kept somewhere near normal. The greatest danger arising, apart from the destruction of vineyards, is the question of allowing the cellars to become empty, resulting in the dislocation of local and the probable loss of the export trade.

Vine Propagation in New South Wales.

After completing my observations of downy mildew in Victoria I passed on to New South Wales with the object of looking into the matter of vine propagation in that State. Before proceeding to Sydney I went across, *via* Wangaratta, to Albury, and while there took the opportunity of meeting Mr. Geo. Frere, one of the leading vine-growers of the district. Mr. Frere has in the past carried out some very interesting work in connection with the green manuring of vines, to which I was able to refer in a paper on the subject of "Vine Manuring," delivered before the Agricultural Bureau Congress held

in Adelaide in 1913. Unfortunately since that time, this vineyard, as well as most of the others in the locality, have been destroyed by phylloxera.

From information gathered, the destruction of the vines was particularly rapid from the time of the first indications of disease were apparent. The first manifestation of the presence of phylloxera was in 1913, and it was assumed that, in all probability, at least five years of production remained to the vines. In the meantime reconstitution would be proceeded with as fast as possible. This assumption proved wrong, however, for the effects of the disease, coupled with the dry conditions of 1914, completely finished the old vines. I had opportunity of inspecting the reconstituted vineyard, and was agreeably surprised to note the excellent percentage of vines growing in both the 1915 and 1916 planting. I should say that at a safe estimate it could be put down as not less than 90 per cent., and it evidenced the advantage to be gained by paying every attention to the planting of the vines.

My main object in New South Wales was to visit the Viticultural Station at Narrara, where good work is being done by the Manager, Mr. D. Jenkins, in connection with the propagation of resistant vines.

This nursery is of special interest because it is worked upon lines opposite to those practised at Wahgunyah, in Victoria, and it has given rise to a good deal of conjecture as to which system is right. I was therefore anxious to see and to form my own conclusions on the matter. The opinion which I formed is that both are right in their own particular location, it being simply a matter of difference of climatic conditions. In Victoria the work has to be carried out and the grafts joined or calloused by the aid of artificial heat. At Narrara, on the other hand, the necessary temperatures are obtained under conditions of Nature, and it would, therefore, appear unnecessary to adopt measures for creating artificial heat.

The lowest soil temperature recorded during the winter has been 65 degrees F., or a few degrees below an ideal callousing temperature for grafting. In spring heat and moisture are such as to secure a rapid union of the graft and an excellent growth of the vine. The grafts are made in the usual way, using a slightly longer section than is the case in Victoria and tying with a little raffia to prevent any disconnection when planting. This tying takes a little extra time, but is necessary under the circumstances. It is, however, compensated for by saving of time and labor involved in artificial callousing.

From the grafting sheds the cuttings are planted direct into the nursery beds, where the earth is well mounded up to cover the union of stock and scion in order to prevent evaporation and death. At regular intervals throughout the season scion roots are suppressed, and in the autumn the grafts are exposed in order to harden them.

Up to the present the Narrara nursery has been worked only on a comparatively small scale. Shortage of resistant wood has been the trouble in the past, but supplies are now becoming more plentiful, so that the number of vines grown can be very considerably increased in the future.

The "Yema" Bud Grafts.

As experience of propagation is gained variations of accepted rules are being introduced. One of the principal of these is the so-called "Yema" bud graft. Its use is very applicable to field grafting, and it requires no particular skill to achieve a large measure of success. It is becoming increasingly popular in Victoria, and most excellent results are obtained. A somewhat modified form of the original is used, and with care very high percentages of growth are obtained. It appears to be safer than ordinary field grafting, and it has this advantage, that if the buds fail the vines can afterwards be grafted by ordinary field methods in the spring. The probability is that in the future more resistant rootlings will be planted into the vineyards and afterwards "Yema" budded in the succeeding autumn. There is always a considerable quantity of resistant wood too small for bench grafting, and which is struck in the nursery for subsequent field grafting. With the advent of better knowledge and simplified grafting methods these rootlings are readily sought after. I was struck with one adaptation of the "Yema" bud being experimented with by Mr. Jenkins at Narrara. It consists in putting buds into the annual canes of resistant varieties at intervals of about 15in., and covering them with earth to assist callousing. According to the length of the canes, some four to eight buds were placed in each, and in the coming winter these will be cut into sections and planted into the nursery beds. Under Narrara conditions the buds had taken splendidly, and it would appear that the advantage lies in the fact that a lot of work can be done at what is a fairly slack time in the nursery, and should materially assist the number of vines put out in one season. It will be interesting to note the result of the work already done when the cuttings are growing next season in the nursery. As a secondary means of propagation, the idea should have a good deal to recommend its adoption under conditions prevailing at the Narrara Viticultural Station.

I was considerably impressed with the possibilities of this locality for propagation, the one additional facility necessary to complete success being a supply of water for irrigation in time of scarcity. This however, should not be difficult to supply under the natural facilities at hand. Even without irrigation the summer rains natural to the locality have caused an excellent growth in the young vines.

Before leaving New South Wales I had the pleasure of spending a day in visiting Minchinbury Vineyards at Rooty Hill, where by the courtesy of the Manager (Mr. L. Buring), who is an old student of Roseworthy, I had the opportunity of inspecting the vineyard and cellars, also of tasting a number of wines of all ages. Mr. Buring is an enthusiast in his work, and has placed the Minchinbury wines on a high plane.

The whole of these vineyards have been reconstituted with vines imported from France, and, speaking generally, they appear to be doing well. As already stated, there has been no evidence of the presence of downy mildew in the vines.

Apart from Narrara, the New South Wales Department has another propagating nursery at Mirool, upon the Yanco Irrigation Area, where the work is carried out more upon the Victorian lines, climatic

conditions rendering such necessary. Time would not permit of my going to see this station, however, nor was there any particular advantage to be gained, because in the event of the necessity arising for the establishment of propagation areas in South Australia I am of the opinion that we should have to work along the Victorian lines, using artificial heat for callousing and also to adopt a good deal of field grafting. The propagation of resistant vines is not by any means a simple matter even when all the facilities are to hand, and when it is complicated by a scarcity of resistant wood the problem becomes even more complex. This has to a large extent been the trouble in both Victoria and New South Wales, and I merely reiterate it in the hope that South Australia will not, in the time of need, be in a similar plight.

In closing this report I would express to the Departments in Victoria and New South Wales my sincere thanks for the courtesy extended to me, and particularly to Mr. F. de Castella and to Mr. Jenkins for the information they unstintingly gave me.

The Director of Agriculture (Professor Arthur J. Perkins), in commenting on the report published above, says:—

"Mr. Laffer's arguments in favor of introducing American vines into South Australia are hardly convincing; and whilst I have no intention of opening up the whole question, it would, perhaps, be unwise to let some of his remarks pass without comment.

"Mr. Laffer asserts that 'other countries have had their vineyards destroyed before any effective work in reconstruction has been done, mainly because lack of information on the subject has prevented a thorough grasp of the situation.' He wishes us to infer that had these countries known as much about the phylloxera as is known to-day they would have proceeded replanting on American vines as soon as the pest was discovered in their midst; which, indeed, is the practice he advocates for South Australia.

"Mr. Laffer, and those who think with him, will have to admit that as yet no country in the world has been foolish enough to introduce American vines in anticipation of the phylloxera, and this, curiously enough—the introduction of the cure before the disease—is what we are asked to do. And whilst Mr. Laffer is perfectly correct in the statement that other countries have not fallen back on American vines until their vineyards had been more or less destroyed by the phylloxera, he is, I think, taking a good deal for granted when he infers that had they known more about the subject they would have acted otherwise. Let me point out to him that as much was known in France about the phylloxera and American vines in the early nineties as is known at the present time; and whilst it might be argued that such knowledge had not yet spread to other countries, this argument cannot hold good for countries such as Algeria and Tunis, French colonies in daily contact with the views and ideals of the mother country. And yet, curiously enough, neither of these countries followed the policy which Mr. Laffer finds so logical. Mr. Viala himself, who is often quoted on this subject, advised Algerian vinegrowers to have nothing to do with American vines until they could not do otherwise. I was in Tunis in 1910, and

found that country to have been recently invaded by the phylloxera; but there was no thought of introducing American vines. Every effort, on the other hand, was being taken towards protecting clean vineyards.

"Mr. Laffer's contention that replanting of American vines as soon as existing vines begin to die out will have the effect of maintaining production normal, seems to me altogether untenable. In the first place, it would represent the simplest means of spreading the pest all over the State in the shortest possible time. Although the phylloxera had been discovered in Victoria in the early seventies, it was not until the beginning of this century that the pest spread to any extent; and then only when the Victorians gave up any further attempt to check it and fell back on American vines. We are asked to take our medicine in one gulp; but, after all, are not 30,000 acres of vines worth defending for 20 or 30 years; or are we to allow them to be destroyed in four or five years?

"Those who insisted on importing American vines into Australia were warned of the danger of importing diseases as well; the idea was scoffed at. Downy mildew has already been introduced, and there are many others to come yet, all of which will tend to render vine-growing more costly and less remunerative.

"There are times when 'let well alone' is good policy."

GRAIN WEEVILS.

A MENACE TO THE WHEAT STACKS.

The possibility of weevil taking a heavier toll of our wheat than that taken by mice will be unwelcome news to wheatgrowers, but it is reassuring to notice that the Commonwealth Advisory Council of Science and Industry has already taken steps to inquire into the matter, with a view to devising means to prevent such losses.

The first progress report of the Special Committee, which has just been issued, deals only with the grain weevils (*Calandra granaria* and *C. oryzae*), as these are the only insects attacking stored grain whose destructive effects are serious enough to demand special measures. The following extracts from the report are published:—

The Development of Weevil in Wheat and the Increase in Number of Weevils.

The wheat when bagged in the paddock has no weevil in it. It must come in contact with weevils after that before it becomes infested. This may happen in many ways. (1) Placing the grain in old bags which have been weevil infested, or in store sheds or granaries where there are weevil. (2) Weevils flying from grain stores, feed houses, &c., and working their way into the bags and sacks. (3) Using material in the construction of the foundations or the protection of the wheat stacks—wood, sleepers, old bagging, &c. (4) Bringing bags

of weevil-infested wheat in contact with or stacking near the sound wheat. There must be a female weevil to lay her eggs in a grain of wheat before that grain of wheat is weevil infested. To the naked eye the grains may appear perfectly sound, as the minute hole into which the egg is inserted in the grain does not show. It is when the egg has developed through the maggot, pupa, and perfect insect, and the latter has gnawed a hole through the side of the wheat grain, that the damage to the grain is evident. Not only do the weevils live and breed through their life cycle in the grains of wheat, but the perfect male and female weevils feed upon grain themselves, so that the damage is increasing all the time.

The life history from the egg to the adult beetle varies from 19 to 22 days in a warm suitable temperature. In three months 40 weevils multiplied themselves 60 times and counted out 3,056 weevils.

Destruction of Weevils by Means of Poisonous Gases.

The various methods of treatment by poisonous gases which have been tried either on an experimental or a large scale for the destruction of insect pests in grain are not applicable to bagged grain, save at a prohibitive cost.

In regard to fumigation with carbon bisulphide, 1,000bush. of grain require 10lbs. of carbon bisulphide, and require to be enclosed for 24 hours, with a temperature of 70deg. and not under 60deg. In badly infested wheat a second fumigation is required to get rid of the eggs and weevil inside grain about three weeks later. The cost of bisulphide is 7d. per lb., war rate.

Experiments were conducted with hydrocyanic gas under similar conditions and temperature, and it was proved to be not satisfactory even with 48 hours.

Fumigation with carbon dioxide is the most effective; 14.35 cub. ft. of gas will submerge 1 ton of grain, and can be forced in at the bottom of the wheat or airtight silo. One pound, at atmospheric pressure, occupies a volume of 9 cub. ft., and would cost 3d. per lb. in large quantities. The total cost would be 4¾d. per ton, and the gas could be used over and over again. Carbon dioxide runs to waste in distilleries.

Destruction by Means of Drying.

Wheat from thrashers averages 6.7 per cent. to 7.2 per cent. moisture. When dried in the sun this is reduced to 4.7 per cent. In 4.7 per cent. and 6.7 per cent. of moisture the weevil did not breed. With 8 per cent. moisture the weevils died in six weeks without breeding. With 9 per cent. of moisture the weevils were dormant, and did not breed, but when more moisture was added they became active and bred. With 10 per cent. of moisture the weevils bred, but required free air in order to breed with normal rapidity. Drying the wheat artificially or in the sun, and then storing in air-tight bins is sufficient to prevent weevil from attacking it. If weevily wheat is held under the same conditions the weevils die off. Moisture and a temperature of 80deg. F. without moisture is fatal. Deprived of oxygen all weevils die within seven days.

Certain of the above-described methods are employed in breweries and flour mills for ridding grain of weevils; but it is to be noted that in such cases the grain is treated in bulk and has not to be rebagged. Destruction by such measures of the weevils and their eggs, when they have once seriously invaded the grain, being in the case of bagged wheat extremly costly, it is very important to inquire if there are any means of preventing such an invasion from taking place.

One obvious set of precautionary measures consists of measures for preventing weevil from gaining access to the grain. As has been already pointed out, wheat has no weevil in it when in the field. (This does not hold good of maize.) In order that weevil may not gain access to it during carriage and storage, it must not be packed in old bags which have become already tenanted by weevils, and it must be stored in such a way that weevils will not be able to reach it. Such precautions are difficult to carry out effectively in practice.

The grain weevils are widely distributed, and are very tenacious of life. Moreover, as already mentioned, a very small number gaining access to stored grain are able, *if conditions are favorable*, to multiply enormously in a comparatively short time.

Favorable and Unfavorable Conditions.

A study of the conditions most favorable to the multiplication of grain weevils shows at once that temperature and moisture have to be considered before anything else. Both of these are, of course, capable of being controlled.

The experiments of F. J. Cole, Maxwell Lefroy, and others have shown that the presence of a certain degree of moisture in the grain is essential to the active multiplication of the weevils. This essential percentage of moisture is a high one (10 per cent.), and when wheat is first bagged, under ordinary circumstances, it does not contain nearly sufficient moisture to enable any weevils, however freely they may gain access to it, to increase and multiply.

Unless moisture is actually added from without the grain remains weevil proof. Thus if stored in a fairly dry climate, and completely protected from the weather and from the absorption of moisture from the soil, it is perfectly certain that the grain may be stored indefinitely without danger from weevil.

The problem of the storage of grain in large quantities for more than a few months has never had to be met in Australia until within the last few years. The prevailing methods of transport and of storage appear to be extremely crude and wasteful, and, what is to the present purpose very favorable to the development of weevils. This (the presence of conditions favorable to the grain weevils) holds good more especially of the grain stored on the seaboard. There, even if the protection from the rain water were complete, there is reason to believe that with the moist air freely penetrating the mass of stored bags, the moisture absorbed, even with grain arriving dry, may soon reach the point which favors the rapid multiplication of the pest. But, unfortunately, this moistening of the grain is greatly accelerated by the prevailing methods of storage, which do not by any means afford complete protection from heavy rains.

OFFICINAL PLANTS.

The following information has been supplied by Professor T. G. B. Osborn, M.Sc., to whom a request by a correspondent for a list of plants of medicinal value growing in South Australia, and the purposes for which they were of value, was referred: —

I find that very few officinal plants grow native in South Australia, or indeed in Australia at all. The XIX. edition of "Squire's Companion to the Pharmacopæia" (1916), gives the following for Australia:—

Acacia decurrens—Bark, for tannin.

Alstonia constricta—Bark, aqueous extract for bitter principle.

Eucalyptus globulus and other spp.—Leaves, oil. *E. globulus* and *amygdalina* (the latter only being native of the South-East of this State) were formerly the two officinal species. In practice many species are distilled in South Australia, notably *E. cneorifolia*, found on Kangaroo Island and Eyre's Peninsula, as well as several of the mallees.

Eucalyptus calophylla (Western Australian species)—For kino. Very possibly the kinos of other species are used. Astringents.

Mallotus Philippensis gives the drug kamala. The plant is more or less pan-tropical.

It will be seen that of the above short list only the eucalypts are native of South Australia. A possible exception is *Acacia decurrens*, which is really an eastern Australian species, but which occurs in the extreme South-East of the State.

I know of no reliable account of any other native drug plants that may have local value, except that by Maiden, in the "Useful Native Plants of Australia." But few of the list given by him are South Australian plants. However, the following are:—

Adiantum aethiopicum (maidenhair fern)—Slightly astringent and emetic.

Codonocarpus cotinifolius (quinine tree, medicine tree, horseradish tree)—Bitter principle, but quite different from quinine.

Cymbonotus Lawsonianus—Extract of leaves, with lard, used as a salve.

Duboisia Hopwoodii—The natives' pituri, used for chewing, has an intoxicating effect.

Epilobium tetragonum (native willow herb)—Diuretic.

Erythraea australis (native pink centaury)—Infusion used as tonic in the same way that its relative *Erythraea centaurium* is in Europe.

Hardenbergia (*Kennedia*) *monophylla* (native lilac)—Used as sarsaparilla. Maiden says the virtues are imaginary. I have been told that the common dune climber *Muehlenbeckia adpressa* was used for this purpose by early settlers on the South Australian coast.

Hydrocotyle asiatica—Used in India for skin diseases.

Justicia procumbens—Used in India for ophthalmia.

Melaleuca uncinata (tea tree)—Leaves chewed for catarrh.

Mentha gracilis (native pennyroyal)—Regulating menses.

M. satureioides—Regulating menses.

Mesembryanthemum aequilaterale (pig face)—Astringent properties

Myriogyne minuta, syns. *Centipedia orbicularis and Cunninghami*—Ophthalmic.

Portulacca oleracea—Antiscorbutic. The introduced *Eruca sativa* also has this property.

Pteridium aquilinum (bracken).—The European fern is used as a vermifuge.

Sarcostemma australe—Milky juice used on wounds.

Sebaea ovata—See *Erythraea* above, to which it is related.

Typha augustifolia (bul-rush)—Root stock used in Eastern Asia in dysentery, gonorrhoea, and measles.

It is rather to be regretted that we have not more on record of the uses of "simples" by early colonists. Settlement, with its attendant cultivation, is destroying many of the above plants, though some few of them, *e.g.*, *Erythraea* and *Portulacca*, are likely to survive. Even in Europe the herbalist's is a dying profession, and it is hardly likely to develop in a new country with no wealth of tradition behind it.

Of the introduced plants of medicinal value some mention might be made. Apart from cereals, the following grow in profusion:—

Prunus amygdalus (almond)—Oil from seeds.

Pyrus cydonia (quince)—Mucilage from seeds.

Olea europaea (olive)—Oil from fruit.

No doubt some of the local-grown products find their way to the pharmacists, though Australia is not the "official" source.

The following plants, which are naturalised weeds in South Australia, appear in the British Pharmacopœia:—

Anthemis nobilis (common chamomile)—Flower heads.

Conium maculatum (hemlock)—Full-grown unripe fruits.

Datura stramonium (thorn apple)—Dried leaves and ripe seeds.

Mentha piperita (peppermint)—Oil distilled from fresh flowering plants.

M. viridis (spearmint)—Oil distilled from fresh flowering plants.

Ricinus communis (castor oil)—Oil from seeds.

Rosmarinus officinalis (rosemary)—Oil distilled from flower tops.

Taraxacum officinalis (European dandelion, not the Cape weed, *Cryptostemma calendulaceum*, often called dandelion)—Fresh and dried roots.

The above are all official drug plants. There are, of course, others among our introduced plants of some medicinal value that find their place in books of "simples" and the herbals of European countries. Some of these are possibly of doubtful value, though others may be of real use to a peasantry that is accustomed to their preparation.

WEEDS ON THE EAST-WEST RAILWAY.

(By H. W. ANDREW, Botanical Assistant and Quarantine Officer of Plants, S.A.)

In January last, Captain S. A. White made a collection of plants from the neighborhood of Ooldea, on the East-West railway, between 400-410 miles almost due west of Port Augusta, which he subsequently submitted to Mr. J. M. Black for identification. The majority of these plants as might be expected, are native, while at least one of them, an Acacia or wattle, has not been previously found—at any rate described. The recording of the names of other plants found in that part of the country will also add to our knowledge of their distribution. However, it is not purposed to deal here with these native plants, as detailed notes concerning them will be compiled by Mr. J. M. Black, and subsequently appear in the Transactions of the Royal Society of South Australia.

A feature of more general interest is the appearance of several introduced plants which have already obtained a footing on the railway there, and which it may reasonably be supposed have followed in the wake of the workers on the railway line. It is remarkable that weeds should have been found so early after the commencement of operations along the railway in the heart of the so-called "desert," and it adds another confirmation to the well-known fact that man directly or indirectly is the greatest distributor of weeds. All of the plants collected have not yet been examined, but at least two are weeds that have well established themselves in a number of the settled districts of the State. The better known of these two weeds is the Hoary Cress (*Lepidium Draba, L.*). In parts of the Strathalbyn district it thickly covers cultivated fields, while at Kapunda and elsewhere it also thrives on roadsides and neglected places. It is a native of Europe, Western Asia, and Africa. Professor Ewart states, "This weed, like so many others, was introduced from Europe with impure agricultural seed and also with ballast and fodder, and is especially troublesome in lucerne paddocks. It is a perennial with deeply penetrating roots, pieces of which will continue to grow. It has clusters of small whitish flowers and small flattened pods with one seed in each cell. It is a prolific seed bearer, and altogether is a difficult plant to eradicate. It would be a great nuisance in orchards. Summer fallowing, deep ploughing, and frequent stirring, followed by root crops, will largely suppress it, but cutting or hoeing, unless often repeated, is of little value, since the new roots contain much stored food, penetrate deeply, and quickly form new shoots. Fortunately, so far it is not abundant outside of the places to which it has been introduced, mainly with impure seed, but it appears to be spreading." The other plant also found at Ooldea, is *Verbena supina,* which may now be seen growing vigorously in the North Park Lands, West Adelaide, and other places. Owing to its prolific seeding and adaptability to various conditions here, it is spreading rapidly in many districts of the State.

In view of the fact that large sums of money are expended annually in the United States of America, the Australian States, and other countries in checking the growth of weeds on railways, because of the danger to property by fire originating from locomotives, and the necessity for ridding the railway ballast of rank vegetation, it should be worth while considering the desirability of taking steps in the near future in the direction of carefully recording the exact distribution of introduced plants along this railway line. Such an examination would probably reveal the presence of other weeds which have reached those parts by way of fodder, packing materials, etc., emanating from the camps established in the course of the construction of the railway. It would also pave the way for early and practicable remedial measures, for it can hardly be imagined any weeds have yet spread beyond very limited bounds. Further, the mapping out of the distribution of possible weed pests while the land along the railway line is in a virgin state would furnish an extremely interesting and valuable basis for subsequent study by botanists and others concerned with the encroachment of introduced plants into the domains of native plants. Such data, at first glance, may appear to have but little practical value, but a considerable amount of work along these lines is being performed in other parts of the world, and not without practical results. Probably few parts of the world offer such advantages over so long a stretch of virgin country.

As the East-West railway runs for the most part through a strip of Federal territory about ¼ mile wide, apparently this is a matter for the Federal authorities. Large sums of money have been spent in this State alone by the railway authorities in burning, cutting, and poisoning weeds, and no doubt the Commonwealth Government would save later on a big sum annually by early preventive action in the direction indicated. The destruction of local patches along the line should be a comparatively easy matter now, and obviate the necessity of ultimately incurring great expense. Though a number of weeds grow more vigorously in wet districts, the majority will thrive where cultivated plants will not, and it would be dangerous to assume that they would not spread in the "desert," particularly in the light of the fact that many of our so-called deserts have been found on better acquaintance to prove good wheat growing and pastoral country.

In addition to the plants collected by Captain White, a number of seeds and fruits obtained from the stomachs of birds during the same expedition were preserved and since submitted to me for identification. The results of investigations concerning these seeds, together with a series of other collections made from many parts of Australia, particularly South Australia, will be compiled and afterwards published. The results furnish convincing proof of the large part played by the birds in destroying enormous quantities of various seeds, as well as in distributing other seeds which they are unable to digest.

CONCRETE FENCING POSTS.

The difficulty experienced in some districts in obtaining timber suitable for fencing has naturally tended to direct attention to possible substitutes. Amongst these, reinforced concrete has received a measure of notice, and in reply to a correspondent who sought advice as to the best method of manufacturing concrete fencing posts, the Field Engineer of the Department of Agriculture (Mr. J. Paull) recommended making a mixture of cement concrete composed of 4 parts ¾in. and ½in. crushed hard stone in equal parts, 2 parts sand (not too fine), and 1 part cement, mixed as follows:—Mix the sand and cement together dry, spread the gauged quantity of broken metal in a ring, and then wet, and evenly distribute the sand and cement dry mixture over same, then mix thoroughly, using a watering can or hose with a fine rose to damp off to the right consistency. The mixture should be of a mushy consisteney, so that it can be compacted by joggling it with a shovel. The tamping that would be necessary with a drier mixture would be likely to spring the forms. and displace the reinforcing.

The reinforcing should consist of steel circular rods, say ½in. diameter (not less). One of these rods should be placed at each corner about ¾in. from each side. The rods should be bent over at the ends or looped to prevent slipping in the concrete. To avoid sharp edges, which are easily chipped, triangular strips of wood may be placed in the bottom of the mould, along the sides, and when the moulds have been filled and tamped, similar strips may be inserted on top. The moulds, when in place, should be given a coating of soft soap or crude oil, and this coating should be used as often as necessary during the use of the moulds.

In putting the concrete in the moulds a thin layer should be spread evenly on the bottom, and carefully tamped. On top of this layer, when levelled off, two reinforcing rods should be placed in the desired position. The moulds should then be filled and tamped in thin layers to the level of the other two reinforcing rods, the fasteners for fence wires being inserted during the operation. The remaining concrete should be tamped and levelled off, thus completing the post as far as the moulding is concerned. The posts, when removed from the moulds, should be stood under shelter (on end) and kept damp for at least a week, and should not be used until one month old.

As to the cost of concrete posts, it is impossible to say with anything like certainty owing to the varying local conditions, cartage, etc., but they are sure to cost more than wooden posts, except in districts where wood is scarce. Roughly, they should cost about 3s. each for ordinary rectangular posts, say, 7ft. long.

ADVISORY BOARD OF AGRICULTURE.

The monthly meeting of the Advisory Board of Agriculture was held on Wednesday, June 13th, there being present Messrs. F. Coleman (chair), A. M. Dawkins, J. Miller, T. H. Williams, W. J. Colebatch, G. Jeffrey, G. R. Laffer, M.P., Professor A. J. Perkins, and the Acting Secretary (Mr. H. J. Finnis).

Apologies were received from Messrs. A. W. Shillabeer, C. H. Tuckwell, and Colonel Rowell, C.B.

Stability of Strychnine in Poisoned Animals.

A report was received from the Director of the Department of Chemistry (Dr. W. A. Hargreaves) dealing with the possibility of the bones of foxes that had been poisoned with strychnine becoming a source of danger to livestock which might chew the carcasses. The report stated:—"When animals are poisoned with strychnine, the poison is absorbed by all parts of the body. It is quickly absorbed by the spinal cord, which appears to have the power of collecting the strychnine from the circulation and storing it up in its structure. When the body of the dead animal is decomposed and dried, the bones, especially the backbone, contain some of the poison. Wynter Blyth, in 'Poisons—Their Effects and Detection,' states—'So far as all evidence goes, strychnine is an extremely stable substance, and no amount of putrescence will destroy it.' McAdam found it in a horse a month after death, and in a duck eight weeks after. Nunneley discovered it in 15 animals 43 days after death, when the bodies were much decomposed; Roger, in a body after five weeks' interment; Richter, in putrid tissues exposed for 11 years to decomposition in open vessels; and, lastly, W. A. Noye, in an exhumed body after it had been buried for 308 days. Strychnine could therefore be retained for a long time in the bones and dried tissue of poisoned foxes. The question whether the bones contain poison in sufficient quantity to poison other animals that may chew them depends entirely upon the quantity of poison consumed by the original victim. It appears to me improbable that a poisonous dose of strychnine would be obtained by this means. I know of no poisons which are so convenient and effective as strychnine and arsenic. Both of these substances may be obtained in the form of powders, or as fine crystals, and baits may be easily prepared from them. Strychnine and arsenic are said to be more effective if used together than if used alone. The arsenic acts as an irritant, and the strychnine as a nerve poison. Arsenic, if anything, is more resistant to decomposition than strychnine, and it may be found in the various organs and in the marrow of an animal that has consumed the arsenic; so that from this point of view there is no gain by using arsenic in place of strychnine." It was decided to thank Dr. Hargreaves for the information. The Chief Inspector of Stock (Mr. T. H. Williams) emphasized the danger of distributing strych-

nine in a wholesale manner. In his opinion hundreds of cattle in days gone by had been poisoned in South Australia through eating the bones of rabbits that had been destroyed by strychnine. It was significant that, whereas, in certain parts of the north, the so-called dry bible had been a scourge during the time rabbits were extremely numerous and were being poisoned on a large scale, since the rabbits were practically wiped out little, if anything, had been heard of dry bible.

Nursery Stock.

A report was secured from the Horticultural Instructor (Mr. Geo. Quinn) in regard to the wisdom of introducing legislation designed to protect purchasers of nursery stock against the substitution by the sellers of different varieties. The report read:—

"I am of opinion something should be attempted in the direction of formulating a law to regulate the sale of nursery stocks. This is a subject to which I have given considerable thought over a number of years past, as the injustice complained of has frequently come under my notice in country districts, and more particularly amongst non-professional orchardists. Any such legislation must be carefully thought out, so that no injustice may be inflicted upon nurserymen who are attempting to honestly meet their obligations. I do not propose—unless specially requested so to do—to go into a detailed explanation here of the ideas which are taking shape in my mind, but assure the Advisory Board that I am now in touch with the Fruitgrowers' Association, through Mr. G. A. Dunn, M.P., with a view to the matter assuming a tangible form during the coming session of Parliament. As a preliminary, I consider a meeting of selected representatives of the fruitgrowers and the nurserymen should be invited to confer with me to discuss the shape such legislation should take, so as to ensure justice is secured to all of the interests concerned."

Members of the Board realized that there were big difficulties in the way of arriving at a satisfactory solution of the problem, but decided to assure Mr. Quinn that they would heartily support any practical scheme which he might bring forward. Professor Perkins said mistakes would occur in the best regulated nurseries, and Mr. Laffer, M.P., indicated that the wise course for the purchaser to follow was to secure his trees from reputable nurserymen.

Trucking Facilities at Melrose Railway Station.

The Secretary intimated that reports had been received from the railway authorities that they did not consider that the time had arrived when trucking facilities, other than those which now existed, should be provided at Melrose railway station. Professor Perkins indicated that under present conditions great difficulty was experienced in loading and unloading stock. Mr. Laffer suggested that the local people should approach the Government through the members for the district. It was decided to acquaint the Mount Remarkable Branch of the Bureau with the position.

Wheat Certificates.

The Pinnaroo Branch wrote in regard to the manner adopted in issuing wheat certificates. At present the farmer had to give delivery of the interim receipt before receipt by the local agent of the certificate, they said, and as a consequence was for many days without any acknowledgment for the grain held on his behalf. The Board decided to refer the matter to the Wheat Harvest Board.

River Murray Branches Conference.

A number of resolutions carried at the recent conference held at Waikerie was dealt with.

The Board determined to send on to the Minister of Agriculture resolutions relating to the provision of a Government steamer to trade on the river, the establishment of canning factories, and the more satisfactory carriage of fruit on steamers overseas. A resolution relating to experimental work on the river was referred to the Director of Agriculture.

Transition of Industry and Trade.

A letter was received from the Secretary to the Premier (Mr. J. Sincock), referring to the proposed establishment of an advisory committee to report upon the best means of facilitating the transition of industry and trade from the war to the peace period. The communication concluded with a request from the Premier that the Board should nominate one of its members to represent it on the advisory committee. Mr. G. Jeffrey (Vice-Chairman) expressed warm sympathy with the proposal. He explained that while in Melbourne the previous day he visited one of the wool stores, and there saw 40 returned soldiers learning woolclassing. They all were earnest young men, and he believed the result would be very gratifying. There were limitations in regard to the work for woolclassers, but the rudiments were laid down for entrance to the higher branches of the wool trade, and he would be surprised if, in the years to come, some of those soldiers were not occupying positions of trust in both the buying and selling sides of the business. Mr. Jeffrey was chosen to represent the Board.

Herbs.

Mr. Miller directed attention to a report which had appeared in the press to the effect that a man in Victoria was making £600 a year from the cultivation and sale of herbs, including thyme, sage, and marjoram. He believed that the business had big possibilities, and offered an admirable opportunity for women to engage in a pleasant outdoor occupation. He moved that a report should be obtained from the Government Horticultural Instructor (Mr. Quinn) on the market for herbs, and the outlook for their cultivation in this State. Mr. Jeffrey seconded the proposition, which was carried.

Life Member.

The name of Mr. F. Kraeger, of Eurelia, was added to the list of life members of the Agricultural Bureau.

NEW MEMBERS.

The following additions to the rolls of existing Branches were approved:—

Narrung—George Thornley, John Critchley, Allen McNicol, John Neville; Wirrega—R. C. Hawker, H. C. Rogers; Millicent—L. G. Haines; Salt Creek—R. S. Frost; Wirrabara—Ed. Ayliffe; Forest Range—Les. Edwards; Pinnaroo—L. R. Letheby; Mundoora—M. Fuller; Yadnarie—Walter Kruger; Glencoe—N. A. Cameron; Mount Barker—Isaac Dutch; Mundalla—H. Warland; Rameo—Chas. Matthews, J. Matthews, Rofe Gosling; Laura—Wm. Bills, F. W. Shepherd, H. A. W. Walter; Pompoota—E. A. Sadler, W. A. Battams, W. E. Bulpitt, J. G. Gibson, P. L. Rundell, F. A. Patterson, J. A. E. Svesson, J. Stirling, J. G. Hopkins, W. O. Baumann, T. J. Letheby, A. Collingwood, S. J. Douglas, W. Caffrey, J. B. Munno, G. E. Machell, F. Opie, E. Clarke, H. A. Forster; Port Elliot—W. W. Hargreaves, D. Bamford; Wollowa—Sid. Gilbertson, Thomas Gibson; Mallala—S. Angus, K. C. Catt, J. C. Catt; Eurelia—J. Kildea, A. Hamilton, Joe Cummings, M. P. Daly, F. G. Huppatz, J. G. Badman; Milang—Wm. Scougall, Arthur Rogers, F. W. Deacon, A. B. Saltmarsh; Cummins—Ken. Slater, J. R. Durdin; Coonalpyn—R. A. Millswood; Meadows—C. E. Taylor, H. B. Michelmore, Arthur Verral; Mount Remarkable—E. H. Smith, N. A. Smith, J. R. Hocking, S. H. T. Best, E. W. Gifford, H. R. Freeman, F. Sleader, E. C. Cornish, F. Low, W. H. Oke, W. Girdham; Borrika—R. L. Cowled; Rosy Pine—P. O'Loughlin; Pinnaroo—E. J. Hoffmann; Glencoe—F. H. Jenner; Naracoorte—A. Wennerbom; Geranium—E. Chapman; Blyth—E. H. W. Eckermann, A. C. Grovermann; Berri—A. V. Mills, C. Cooper, E. J. R. Johnston, W. W. Shand, W. Morey; Clarendon—C. Morphett, H. Spencer, R. Harper; Pompoota—G. Barritt, J. McKay.

THE AGRICULTURAL OUTLOOK.

REPORT FOR THE MONTH OF JUNE.

The following reports on the general agricultural condition and outlook of the areas represented by the Government Experimental Farms mentioned below have been prepared by the respective managers:—

Booborowie.—Weather—This month has been very cold, dull showery days with cold piercing winds, only one bright sunny day has been experienced, more than half the days in the month have been wet ones. Crops—A few of the first sown crops are showing through the ground, but the germination is very slow; the mice have thinned out a good deal of the wheat. Natural feed is fair for this district; the cold weather is checking its growth. Stock is in fair condition, but horse stock is going back as the hay is so badly damaged by the mice. Pests—Mice are still the leading pest and can give points to most others; but rabbits are coming along, and will occupy a front place shortly.

Eyre's Peninsula.—Weather—Plenty of rain was recorded for the first half of the month, falls being noted on 13 out of the first 15 days. The last fortnight has been fine, with odd showers, and two frosts were noticed. Altogether 262 points of rain were registered for the month, which is 1in. less than was received last June, and a few points below the average for the past three seasons. Over 9in. have been recorded for 1917 to date. Crops—All the early sown crops have germinated and are coming along well. Seeding is now practically completed. Approximately 800 acres have been sown to cereals in the hundred, of which about 200 acres were not sown until comparatively late. Natural Feed—Spear grass is very plentiful, and a little geranium is to be seen about. Very little except self-sown cereals is showing on last season's stubbles. Stock—A slight digestive ailment has been troubling some of two settlers' horses, due probably to stomach parasites or the roughness of feed. Pests—Rabbits are troublesome to many young crops. Birds are severe on sown but non-harrowed land. Mice are much more scarce.

Kybybolite.—Weather—This month has been one of little rain, 133 points being distributed over a fortnight, commencing on the 4th instant. Temperatures have been mild, with the exception of severe frosts on the 25th and 26th. Crops—Seeding operations have been considerably advanced, but a considerable area will be sown yet, weather permitting. Although we have had an unusually dry month some fallow lands are still too wet from the efforts of the heavy May rains to permit of sowing. Crops that have germinated well are growing satisfactorily, but poor germinations have resulted over certain areas where sown under too wet conditions. Natural feed is plentiful and of fair length. Stock are in good order generally; sheep are looking exceptionally well, and lambing results are better than the average.

Turretfield.—Weather—During the month 192 points of rain were registered. Rain fell on 15 days, the highest fall for one day being 40 points. The weather generally was wet and cold, and one severe frost was experienced. Crops—Owing to the fact that the rain was spread over such a long period—the longest period of fine weather being five days—seeding operations were severely hampered. Farmers were forced to push on with their work, but the land was not in good condition for sowing. Early crops show a distinct yellow tinge, probably due to the water-logged condition of the soil. Natural feed is not making rapid growth. The lambing percentage throughout the district has been good. Stock is healthy, and in fair to good condition. Pests—Mice are still plentiful, but beyond some damage to the hay and wheat stacks are not doing much harm. Grain sown in the field does not seem to be interfered with.

Veitch.—Weather—Rainfall for the month to the 26th is 95 points. Veitch averaged for the same month 171 points. We have had a few heavy frosts during the past week followed by rather cold days. Crops—Early sown crops are forging ahead and making a nice plant. In parts of the district the later sown fields are having a tussle with mice; this pest has done so much damage that some fields will need resowing. Natural Feed—Good. Stock all doing well. Pests—Mice. Miscellaneous—The area under crop in this district this year is a good deal short of last season, so much time has been lost awaiting a good fall of rain to clear out mice.

DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Ltd., report on July 2nd:—

BUTTER.—Production during the month of June showed a substantial increase, so that this State no longer looks to the East for any of its supplies. Under the influence of the larger quantities coming forward values have receded, and rates at the close of the month for butter in pound prints were "Alfa," 1s. 4d.; "Primus," 1s. 3½d.; third grade creamery, 1s. 1d. to 1s. 1½d. per lb. The high prices that have been ruling for tops for some time have stimulated demand for choice separators and dairies, which sold at from 1s. to 1s. 2d. per lb.; fair quality, 11d. to 1s.; store and collectors', 11d. to 11½d. per lb.

EGGS.—The forwardings have considerably improved, and consequently larger quantities were offering than the market could readily absorb, so that in the absence of interstate trade to any extent, prices showed a very substantial drop, rates at the last market of the month being 10½d. per dozen loose for hen; duck, 11½d.

CHEESE.—Stocks are shortening, but there is no alteration in quotations to chronicle, good business being put through both for local and export; values being from 9d. to 9½d. per lb. for large to loaf.

HONEY.—It is late in the season to expect any consignments to come forward, only odd lots arriving which are readily cleared at 4½d. to 4¾d. per lb. for prime clear extracted.

ALMONDS.—Prices have again advanced, but this has not interfered with demand, export orders being unfulfilled. Brandis, 11½d. to 1s.; mixed softshells, 11d. to 11½d.; hardshells, 6d.; kernels, 1s. 10d. per lb.

BACON.—Values have eased, but not to any great extent considering the much larger quantities that are now coming to hand, but hams are finding slow sale. Best factory-cured sides, 10d. to 10½d.; middles and hams, 11d. to 11½d.; rolls, 9d. per lb.

LIVE POULTRY.—Heavy pennings have been catalogued during the month, and to a good attendance of the trade spirited bidding ruled, prices all round showing a slight improvement. Heavy-weight table roosters, 2s. 9d. to 4s. 1d. each; nice-conditioned cockerels and plump hens, 2s. 3d. to 3s. 6d. each; light birds, 1s. 6d. to 2s.; ducks, 2s. 2d. to 4s. 1d. each; geese, 4s. 6d. to 5s. 9d. each; pigeons, 5d. to 6d. each; turkeys, from 7d. to 9½d. per lb. live weight for fair to good table birds.

POTATOES.—The potato market continues to be very freely supplied from the Mount Barker, Gumeracha, and Mount Gambier districts, and nearly all the crops being dug are yielding more heavily than was anticipated.

ONIONS.—Although most of the onion demands are still being filled from within the borders of South Australia, the tone of the market has improved considerably, and prices are a good 10s. better than last month. Quotations:—Potatoes, £4 to £4 10s. per ton on rails Mile End or Port Adelaide; onions, £5 15s. to £6 5s. per ton on rails Mile End or Port Adelaide.

RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall at the subjoined stations for the month of and to the end of June, 1917, also the average precipitation to the end of June, and the average annual rainfall.

Station.	For June, 1917.	To end June, 1917.	Av'ge. to end June	Av'ge. Annual Rainfall
Far North and Upper North.				
Oodnadatta	—	3·28	3·06	4·76
Tarcoola	0·74	5·10	3·15	7·58
Hergott	0·20	2·67	3·29	6·04
Farina	0·72	3·67	3·73	6·70
Leigh's Creek ...	0·90	5·86	4·70	8·66
Beltana	1·23	6·81	4·87	9·22
Blinman	1·92	6·49	6·71	12·83
Hookina	4·19	13·19	5·10	—
Hawker	3·79	12·84	5·75	12·22
Wilson	3·23	9·73	5·66	11·78
Gordon	3·07	11·53	4·58	10·26
Quorn	2·92	9·78	6·18	13·78
Port Augusta....	2·37	6·12	4·78	9·46
Port Augusta W..	2·48	6·64	4·40	9·36
Bruce	2·13	7·58	4·42	10·01
Hammond	2·45	10·60	5·15	11·46
Wilmington	3·27	10·23	8·23	18·26
Willowie	2·54	9·92	5·21	11·90
Melrose	4·67	16·60	10·71	23·04
Booleroo Centre..	2·76	11·22	6·95	15·83
Port Germein ...	2·70	8·34	6·11	12·84
Wirrabara.....	3·37	13·26	8·58	18·91
Appila	2·04	9·60	6·71	15·08
Cradock	2·73	9·98	5·10	10·86
Carrieton	2·74	11·44	5·48	12·22
Johnburg	2·72	9·44	4·50	10·21
Eurelia	2·81	11·74	5·86	13·24
Orroroo	2·45	11·45	6·31	13·42
Black Rock	2·09	10·48	5·71	12·25
Petersburg	2·25	11·38	5·73	13·07
Yongala	2·09	11·45	6·10	13·94
North-East.				
Ucolta	2·10	9·92	—	—
Nackara	1·63	9·45	4·04	—
Yunta	2·53	9·59	4·41	8·22
Waukaringa	2·31	8·30	3·96	7·94
Mannahill	2·03	7·40	4·11	8·46
Cockburn	0·64	7·12	4·13	7·97
Broken Hill, NSW	0·42	8·23	4·89	9·63
Lower North.				
Port Pirie	2·03	8·68	6·46	13·21
Port Broughton .	1·62	6·92	8·86	14·33
Bute	2·15	9·28	7·20	15·42
Laura	2·66	11·11	8·02	18·22
Caltowie	2·13	10·16	7·39	17·27
Jamestown	2·15	10·67	7·44	17·46
Gladstone	2·70	10·46	6·98	16·00
Crystal Brook....	2·68	9·70	7·08	15·62
Georgetown	2·71	11·39	8·22	18·32
Narridy	2·28	10·05	7·58	16·79
Redhill	2·69	10·67	7·70	16·79
Lower North—*continued.*				
Spalding	2·99	11·45	8·19	20·25
Gulnare	2·81	11·29	7·54	19·74
Bundaleer W. Wks.	3·14	11·04	7·01	17·29
Yacka	1·93	9·77	6·84	15·27
Koolunga	2·21	10·59	7·13	15·94
Snowtown.....	2·15	9·78	7·31	15·70
Brinkworth	2·65	10·22	6·91	15·48
Blyth.....	2·40	10·79	7·58	16·34
Clare	3·33	16·56	10·95	24·30
Mintaro Central...	3·73	17·38	9·62	21·99
Watervale.....	3·50	19·27	12·28	27·17
Auburn	3·22	17·62	10·19	24·25
Hoyleton	3·06	11·71	8·18	17·96
Balaklava	1·79	8·71	7·44	16·03
Port Wakefield ..	1·78	9·40	6·69	13·13
Terowie	1·81	8·87	5·85	13·71
Yarcowie	2·03	10·17	6·15	13·91
Hallett	1·63	7·88	6·95	16·40
Mount Bryan ...	1·62	8·40	6·77	15·73
Burra	1·76	9·24	8·01	17·82
Farrell's Flat	2·29	9·18	8·46	18·87
West of Murray Range.				
Manoora	2·63	12·41	7·93	18·09
Saddleworth	2·51	12·17	9·06	19·69
Marrabel	3·27	12·37	8·58	18·94
Riverton	2·89	14·75	9·42	20·48
Tarlee	2·31	11·51	7·62	17·48
Stockport	1·94	11·62	7·36	15·89
Hamley Bridge ..	1·89	9·07	7·73	16·45
Kapunda	2·13	11·26	9·03	19·67
Freeling	2·42	9·67	8·20	17·85
Greenock	2·63	11·78	9·62	21·46
Truro.....	2·56	11·38	8·85	19·74
Stockwell	2·51	10·95	8·02	20·30
Nuriootpa	2·74	11·15	9·43	21·25
Angaston	2·99	12·97	9·97	22·25
Tanunda	2·77	12·02	10·29	22·28
Lyndoch	3·14	12·45	10·24	23·01
Adelaide Plains.				
Mallala	1·74	8·79	7·91	16·88
Roseworthy	2·21	10·25	8·09	17·31
Gawler	2·28	11·92	9·05	19·21
Two Wells	1·68	7·33	7·87	16·36
Virginia.....	2·04	10·40	8·36	17·58
Smithfield	2·10	11·98	8·23	17·30
Salisbury	2·92	11·36	8·97	18·67
North Adelaide ..	3·06	16·44	11·21	21·49
Adelaide	2·61	13·82	10·14	21·04
Brighton	5·76	17·51	10·51	—
Glenelg	2·30	12·18	8·95	—
Magill	4·13	18·41	12·24	19·93

RAINFALL—*continued.*

Station.	For June, 1917.	To end June, 1917.	Av'ge. to end June.	Av'ge. Annual Rainfall
ADELAIDE PLAINS—*continued.*				
Glen Osmond ...	4·15	19·55	12·17	25·26
Mitcham	3·27	15·23	11·25	23·47
Belair	4·53	—	13·84	28·64
MOUNT LOFTY RANGES.				
Teatree Gully....	4·41	18·87	13·54	28·19
Stirling West ...	8·56	34·34	21·61	46·70
Uraidla	7·64	35·36	20·64	44·35
Clarendon	4·30	19·77	15·69	33·67
Morphett Vale ..	3·59	14·09	10·85	23·32
Noarlunga	3·30	14·25	9·47	20·28
Willunga	4·37	17·82	12·05	25·98
Aldinga	3·36	14·04	9·54	20·34
Normanville	2·69	12·26	9·85	20·65
Yankalilla.....	3·16	14·57	11·29	22·78
Cape Jervis	3·06	10·40	7·59	16·34
Mount Pleasant .	4·42	15·39	12·15	26·87
Blumberg	5·53	19·35	13·25	29·38
Gumeracha	5·63	23·04	14·45	33·30
Lobethal	5·28	14·23	15·87	35·38
Woodside	6·13	21·31	14·07	31·87
Hahndorf	5·41	18·59	15·40	35·45
Nairne	4·56	17·04	13·01	28·83
Mount Barker ...	5·49	21·70	13·78	30·93
Echunga	5·28	21·42	15·27	32·83
Macclesfield	4·19	18·72	13·46	30·72
Meadows	5·41	25·05	16·17	35·52
Strathalbyn	2·10	10·22	8·83	19·28
MURRAY FLATS AND VALLEY.				
Wellington	1·35	8·27	7·05	15·01
Milang	1·64	7·41	7·54	16·08
Langhorne's Brdg	1·36	7·71	6·71	15·27
Tailem Bend	1·58	10·10	6·42	—
Murray Bridge ..	1·14	6·39	6·66	14·32
Callington	1·70	8·04	7·21	15·65
Mannum	1·18	5·56	5·71	11·67
Palmer	2·44	7·93	6·09	15·60
Sedan	1·55	6·26	5·75	11·92
Blanchetown	0·67	2·19	5·09	—
Eudunda.....	2·09	8·48	7·81	17·33
Sutherlands	1·19	4·08	4·71	10·71
Morgan	1·00	3·23	4·19	10·60
Waikerie.....	1·00	—	—	—
Overland Corner .	0·88	4·89	5·33	11 42
Renmark	1·39	7·30	4·79	10·93
Loxton	1·11	8·82	4·38	—
WEST OF SPENCER'S GULF.				
Eucla.....	1·33	6·99	5·56	10 13
White Well.....	1·68	6·87	4·29	9·67
Fowler's Bay ...	2·62	9·60	6·19	12·11
Penong.....	2·31	8·35	5·12	11·93
Murat Bay	1·62	7·28	4·81	—
Smoky Bay	2·78	8·11	-	—
Streaky Bay.....	5·21	11·42	7·38	15·31

Station.	For June, 1917.	To end June, 1917.	Av'ge. to end June.	Av'ge. Annual Rainfall
WEST OF SPENCER'S GULF—*continued.*				
Port Elliston	4·10	12·45	7·75	16 49
Port Lincoln	4·60	12·33	9·23	19·88
Tumby Bay	1·95	7·63	7·24	15·00
Carrow	3·40	12·28	—	—
Cowell	1·61	6·41	5·76	11·76
Point Lowly.....	1·64	6·88	5·35	12·21
Cummins	3·23	—	—	—
YORKE'S PENINSULA.				
Wallaroo.....	2·11	8·49	7·14	14·05
Kadina.....	2·72	9·32	7·75	15·88
Moonta	1·92	9·75	7·72	15·22
Green's Plains ...	2·05	8·62	7·35	15·73
Maitland	2·79	13·54	9·62	20·08
Ardrossan	2·00	8·51	6·71	13·89
Port Victoria ...	1·86	10·46	7·53	15·21
Curramulka	2·74	12·17	8·48	18·50
Minlaton	4·27	13·40	8·23	17·41
Stansbury	2·70	13·04	7·90	17·06
Warooka	3·44	13·05	8·06	17·71
Yorketown	3·64	11·47	8·00	17·47
Edithburgh	3·62	12·06	7·91	16·48
SOUTH AND SOUTH-EAST.				
Cape Borda	4·46	12·15	12·09	25·09
Kingscote	3·01	11·37	8·76	18·95
Penneshaw	2·80	9·55	10·10	21·34
Cape Willoughby..	3·26	10·88	8·89	19·69
Victor Harbor ...	2·75	13·00	10·13	22·18
Port Elliot	2·91	12·21	9·35	20·33
Goolwa	2·50	11·96	7·37	17·93
Pinnaroo	1·55	7·22	6·76	16·74
Parilla	1·54	7·19	—	—
Lameroo	1·39	7·58	7·14	16 55
Parrakie	1·17	7·83	6·07	—
Geranium	1·47	9·50	5·91	—
Peake	1·98	10·16	7·13	—
Cooke's Plains ..	1·88	10·29	6·68	14·74
Meningie	1·95	11·33	8·71	—
Coonalpyn	1·99	11·37	7·77	17·49
Coomandook	2·07	11·75	7·63	16·80
Tintinara	2·41	11·00	8·16	18·78
Keith.....	1·93	10·59	7·96	—
Bordertown	1·36	11·10	8·62	19·76
Wolseley	1·07	8·68	7·84	17·72
Frances	1·37	9·53	8·51	20·74
Naracoorte	1·90	11·18	10·04	22·60
Penola	2·50	12·74	10·75	26·78
Lucindale	2·54	11·52	10·18	23·32
Kingston.....	2·54	13·27	11·50	24·73
Robe	2·38	10·77	11·39	24·69
Beachport.....	2·28	12·52	13·02	27·51
Millicent	2·84	13·41	13·76	29·25
Mount Gambier .	2·74	14·04	14·13	32·00
C. Nrthumberland	2·58	12·65	12·08	26·63

AGRICULTURAL BUREAU REPORTS.

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Arden Vale & Wyacca	*	—	—
Arthurton	*	—	—
Balaklava	*	—	—
Beaufort	*	—	—
Beetaloo Valley	996	—	—
Belalie North	999	28	—
Berri	†	4	1, 29
Blackheath	1016	—	4
Blackwood	1016	16	20
Blyth	999	14	—
Bookpurnong East	‡	—	—
Booleroo Centre	1000	—	—
Borrika	1006	—	—
Bowhill	*	—	—
Brentwood	‡	5	—
Brinkley	1015	—	—
Bundaleer Springs	996	—	—
Burra	*	—	—
Bute	*	—	—
Butler	1004–6	—	—
Caltowie	*	—	—
Canowie Belt	§	—	—
Carrieton	995	—	—
Carrow	*	—	—
Cherry Gardens	1018	3, 31	28
Clanfield	‡	—	—
Clare	*	—	—
Clarendon	1018	2, 30	—
Claypan Bore	*	—	—
Colton	*	—	—
Coomandook	*	—	—
Coomooroo	*	—	—
Coonalpyn	*	—	—
Coonawarra	*	—	—
Coorabie	*	—	—
Cradock	†	—	—
Crystal Brook	‡	—	—
Cummins	1004	7	4
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Davenport	*	—	—
Dawson	*	—	—
Denial Bay	*	—	—
Dowlingville	†	—	—
Edillilie	*	—	—
Elbow Hill	1004	—	—
Eurelia	*	27	—
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Forster	†	—	—
Frances	*	—	—
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Glencope	*	—	—
Goode	*	—	—
Green Patch	*	—	—
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Ironbank	§	—	—
Julia	*	—	—
Kadina	*	—	—
Kalangadoo	1022	14	11
Kanmantoo	1021	28	25
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Ki Ki	1015	—	—
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Morchard	*	—	—
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Mount Hope	*	—	—
Mount Pleasant	*	—	—
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Mundalla	†	11	8
Mundoora	*	—	—
Murray Bridge	*	—	—
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Myponga	*	—	—
Myrla	*	—	—
McNamara Pore	*	—	—
Nantawarra	*	—	—
Naracoorte	1025	—	—
Narridy	1000	—	—
Narrung	‡	—	—
Netherton	*	—	—
North Booborowie	998	—	—
North Bundaleer	*	—	—
Northfield	1001	3	2
Orroroo	*	—	—
Parilla	*	5	—
Parilla Well	*	—	—
Parrakie	*	—	—
Paskeville	*	—	—
Penola	†	—	—
Penong	1006	14	11
Petina	*	—	—
Pine Forest	*	—	—
Pinnaroo	1007	—	—
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Riverton	*	—	—
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Stockport	*	—	—
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Wollowa	*	—	—
Woodleigh	*	—	—
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*No report received during the month of June. † Formal report only received.
‡ Held over until next month. § In recess until termination of war.

ADVISORY BOARD OF AGRICULTURE.

Date of Meeting—July 11th and August 8th, 1917.

THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.

If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.

MEMORANDA FOR THE MONTH.

CONGRESS.—The Twenty-eighth Annual Congress will take place in the Osborne Hall, Gouger Street, Adelaide, on Monday, September 10th, Tuesday, 11th, and Wednesday, 12th. A large number of subjects was suggested by Branches, and the agenda is now being considered, due regard being given the suggestions of Branches.

BRANCHES' ANNUAL MEETING.—Owing to the necessity for economising space, the reports prepared by Hon. Secretaries of Branches will not be published in the *Journal* in any but exceptional circumstances, and when no other business has been transacted at the meeting, it will be recorded in the index to reports as "formal." Nevertheless Hon. Secretaries should not neglect to forward a copy of the annual report to the Secretary of the Advisory Board.

MEMBERSHIP.—The third of the members on the roll, viz., those who have attended the fewest meetings, should retire at the end of the year. Any or all of these are eligible for re-election should the Branch be disposed to recommend their reappointment.

FARM COMPETITIONS.

DISTRIBUTION OF PRIZES AT NARACOORTE.

At the monthly meeting of the Naracoorte Branch of the Agricultural Bureau, held on May 12th, the Farm Competitions Committee presented its first annual report. It was mentioned that there had been 22 entries in the series of competitions held during the year, and as a result of the 12 months' experience, the committee made several suggestions, the adoption of which it was thought, would be beneficial.

The distribution of prizes to the successful competitors was entrusted to Mr. W. H. Smith, formerly Hon. Secretary to the Branch, and to whose energy the inauguration of the competition was due. In presenting the prizes, Mr. Smith said he believed such competitions would lead to improved methods of farming, which in turn would mean an increased production, and a consequent benefit to the town, the district, and the State.

The awards were as follows:—Best-kept farm, over 500 acres—First, Mr. J. M. Wray; second, Mr. R. A. Miles. Best-kept farm, under 500 acres—First, Mr. T. Waugh; second, Mr. Scholz. Best crop of wheat—First Mr. A. Bradley; second, Mr. R. A. Miles. Fallow—First, Mr. W. Loller; second, Mr. Schinckel. Crop of oats—First Mr. R. A. Miles; second, Messrs. D. Kay and Miles.

REPORTS OF BUREAU MEETINGS.

UPPER-NORTH DISTRICT.

(PETERSBURG AND NORTHWARD)

CARRIETON (Average annual rainfall, 12.22in.).

May 31st.

TREE PLANTING.—Mr. F. Kaerger contributed a short paper on this subject, in the course of which he mentioned that ploughing several deep furrows has been found more successful as a preparation for planting trees than digging holes. To

secure a quick germination of wattle seed, he advised soaking them in boiling water and leaving in a warm place for 24 hours. After that, if sown in a well-worked furrow, the plants should be up in 10 or 14 days. He recommended that wattle seed should be gathered about the end of December. In the discussion which followed, it was agreed that ploughing the ground was better than digging holes for the trees.—A discussion took place on the mice plague. The Chairman recommended placing all seed wheat and horse feed, such as grain and chaff, on a mice-proof stand, made by placing short posts in the ground, with kerosine tins with the tops cut out inverted over the posts.

WEPOWIE (Average annual rainfall, 13in. to 14in.).

June 2nd.—Present: 13 members and one visitor.

ANNUAL MEETING.—The Hon. Secretary (Mr. T. F. Orrock) read the annual report, which was followed by the election of officers. "More Production" was the subject of a paper contributed by Mr. J. Burns. He advised members to economise in men, but to spend on machinery and horses wherever possible. Seeding should be commenced when the ground was moist, preferably after a nice rain, and the grain drilled in to a depth of 2in. or 3in. While mice were so troublesome it was a good plan to drag a chain or a set of harrows after the drill, thus saving an extra team of horses. It was not advisable to sow too thickly on fruitful soil, as besides being wasteful, it was injurious to the crop. Should the soil be too wet, too dry, or mice prevalent in the fields, then one could sow more seed to allow for some seeds not germinating. Another factor to be considered was to see that the wheat was graded and picked, which would materially increase the yield at harvest time. He favored land dressed with super. at the rate of 80lbs. to 100lbs. per acre.

WILLOWIE, June 8th.—IRRIGATION—A short paper under this heading was contributed by Mr. W. B. Bull, who referred to the importance of irrigating where intense culture was practised. He mentioned the success which had attended water conservation and reticulation schemes, not only in modern times, but in ancient days.

MIDDLE-NORTH DISTRICT.

(PETERSBURG TO FARRELL'S FLAT.)

BEETALOO VALLEY (Average annual rainfall, 18in. to 19in.).

June 4th.—Present: nine members and three visitors.

HOW TO MAKE FARM LIFE ATTRACTIVE.—One of the chief attractions of farm life, said Mr. W. Pearce, in dealing with this subject, is to have the animals on the farm as near perfection as possible. The time spent in caring for and studying the animals would repay in many ways. Any improvement of the farm, such as a well laid out stable, good sheds, &c., all tended to make the surroundings more congenial. Mr. Burton considered that fruit trees and flowers were necessary. Mr. Berry thought that social life on the farm was also essential. The majority of members favored the use of the oil engine for chaffcutting, owing to the high price of petrol. Mr. Berry spoke of the prevalence of weevil in wheat.

HANDLING STEERS.—Mr. D. Boehm read a paper on this subject. The first requirement was a good strong post-and-rail fence. A good plan to catch the steer was to drive him up on the offside of an old worker and then yoke them together. It was unwise to keep the young steer bowed for too long a time, as that tended to make the neck sore. The animal should not be illtreated, or it would cause a good deal of trouble. Messrs. Clogg and Cox thought for rough work steers were equal to horses.

BUNDALEER SPRINGS.

May 30th.—Present: eight members and four visitors.

POULTRY ON THE FARM.—Mr. S. H. Ellis contributed a paper on this subject. He advocated the keeping of only fowls of a good type, and favored White Leghorns with a few Black Orpingtons to do the rearing of chickens. By the outlay of extra capital in the first place on a breeding pen of some well-tried variety of White Leghorn laying strain, and by hatching in the spring months, the pullets would begin to lay in February, and continue for 12 months without moulting.

Warm quarters for winter were recommended, and the studying at all times of the comfort and convenience of the birds. Dust baths were essential, and disinfecting houses and spraying to eradicate tick and poultry mites were equally necessary. Perches should be low, and all of the same height (18in. to 2ft. being high enough), made of 2in. x 1in. timber fixed on 2in. x 2in. jarrah uprights. The low perch saved quarrelling over high positions at night, and was better for the fowls when flying off in the morning. In the matter of sickness in poultry, unless the bird be specially valuable the best plan was to resort to heroic measures and introduce the axe to the sickly one, afterwards cremating or burying deeply. Feeding grain in the morning in good clean scratching litter and mash at night in troughs was recommended, with plenty of chaffed green feed in the latter. Plenty of clean water, well shaded from the heat in summer should be supplied at all times, and drinking vessels scoured and disinfected regularly. Nests should be low and dark, and secluded to prevent egg-eating. A cockerel of 12 months and six to nine hens, two years old, should form the breeding stock, selected for vigor and health. In order to distinguish cockerels from pullets they should be kept in a yard by themselves. It was not wise to keep hens after the third year. They should then make room for younger stock. A discussion followed, in which Mr. Giles stated that in view of the mischief which fowls caused in stable mangers, and on harness and machinery, he preferred keeping them confined to a yard about 50yds. square. He favored Black Orpingtons as a general purpose bird, and advocated keeping roosters separate from laying hens, as infertile eggs were best for market purposes. Mr. O'Dea favored keeping a good strain of White Leghorns, which he found were no worse for flying into mischief than crossbred fowls were. The subject of fattening was raised by Mr. J. Travers, and it was considered best to keep the fowls so to be treated in a small yard and fed liberally on fattening foods.

LEIGHTON (Average annual rainfall, 16in. to 17in.).

May 3rd.—Present: 11 members.

FORESTRY.—This subject was dealt with in the following paper by Mr. Tim. Hogan. The subject of tree planting, he said, deserved consideration, whether it be for the beautification of parks, or streets, or private properties, or for shelter for stock and people, and the supply of woods for generations to come, and Nature's requirements for atmospheric conditions. It therefore places every man or woman, especially farmers and others living on large areas of land, under an obligation to plant trees, instead of, as was the general rule throughout the world, destroying timber, and not planting to replace the wastage caused. Taking their own local district, they were situated in one of the most fertile localities in the State, which had been left by Nature almost devoid of timber; therefore their motto should be to plant, and plant unsparingly, especially breaks for shelter from the cold winds of winter and the hot sun of summer, for stock, and for future generations of farmers of the district for the supply of timber, the natural supply of which every year was being not only diminished, but also the quality was getting worse. If every farmer were to lay out to plant with trees at least one acre of every hundred he possessed, not necessarily at once, they would confer a great benefit on the country. The variety of trees depended to a great extent on the nature of the soil; but for an all-round useful as well as ornamental tree, the sugar gum took a power of beating, as well as being a quick grower in nearly all classes of soil. The red gum was perhaps the most valuable tree, but required a better class of soil; but wherever it could be planted it should be. Pines also did well in some soils, especially slaty, limestone country, and were a very nice ornamental tree for planting around the homestead. In conclusion, never knock off the planting until there was a good solid fence around the plantation, as the trees could not grow if they were being continually knocked about by stock. A good discussion followed.

MINTARO.

May 5th.

SEEDING.—Mr. A. L. Sandow prepared a paper in which he said:—"In the first place I would recommend most careful attention to the implements used for seed time. The drill should be well overhauled, any cogs showing the worse for wear should be replaced. A little addition I would suggest for a farmer to add to his drill is a piece of ¾in. or 1in. rod of iron running from the ends of one pole across to the other. More particularly this applies to either a four or five horse drill.

With a rod running across the ends if a pole strikes a post it brings the strain on both poles, and saves a breakage. When turning the drill at the end of the paddock from which you are filling, do not turn the drill right around on the mark for starting, but stop half-way, or the nearest possible position to the manure and seed. Then the cultivator should have the most careful attention. Every tine should be perfectly true, the frame of the implement should be free from any strain, and the shares should be so running as to give plenty of lap to ensure killing every weed. A good set or two of light harrows should always be at hand; they should not be too heavy in the event of harrowing after the drill. Another thing which should be attended to is the harness. The preparation of the seed wheat is of most importance. In this particular season the first problem is to protect the seed from mice. A very good plan for one is to put the wheat on the trolly or wagon and put pieces of tin around the wheels. Another common practice is to make a stand on about half a dozen posts in the ground with a petrol tin put over the top of each. This also proves very satisfactory. The seed should be thoroughly cleaned or graded. If any foreign small seeds are in the wheat, and a winnower is used for cleaning, a drake screen should be added. The wheat should not be pickled more than 30 hours before being sown, preferably using formalin, this being the least injurious to the germination of the plant, and also very convenient for applying the liquid. If the soil is carefully and intelligently prepared, even with a very small rainfall good results may be obtained. This was evidenced on many farms in this district in 1914, when we had the smallest rainfall on record. I would insist on early fallowing, particularly where there is much stubble or rubbish to be ploughed under. Burn the stubble off a paddock which you intend fallowing, and cultivate it early in March, perhaps after a summer rain. This will hold the moisture, and will work freely late in the season, otherwise it may be too hard to plough. After ploughing the land ordinarily it should be allowed to remain untouched for a few weeks to allow the rain, sun, and air to act on it before harrowing. When the land is harrowed directly behind the ploughs the ground becomes too sour. The result is that the harrows work the land into such a condition that it is impossible to get it back to a nice tilth. Avoid harrowing the very red ground. Its tendency is always to run together too much. About October and November in this district the cultivator should be put through the fallow at a depth not exceeding 3in., and great care should be taken to cut all the weeds. After this until seed time the sheep should be allowed frequently to run over the fallow paddocks to keep down any weeds that may appear. After every summer rain make it a habit to run the sheep over the fallow. A fair-sized flock of sheep running over fallow after rain is almost like a very light set of harrows shifting the surface, at the same time compressing the subsoil and thus creating a good seedbed."

NORTH BOOBOROWIE (Average annual rainfall, 16.35in.).

May 9th.—Present: five members.

FLY-BLOWN SHEEP.—Mr. W. E. Hannaford introduced this subject. It was noted how, of late years, the flies had become very much worse, and whereas formerly they confined their attentions to wounds, blood, &c., on sheep, now they struck healthy sheep and the unsoiled wool on any part of the body. All the authorities quoted conceded the fact that no treatment gave more than temporary immunity from the flies. The most thorough dipping only ensured protection from blowing for a few weeks, as also did crutching. It was allowed that the only means of combating the trouble was constant attention to the sheep, and immediate treatment of the sheep when blown, and of those likely to be blown, at times when flies were particularly bad. The treatment recommended was to subject the affected parts on those likely to become blown to a very strong jet of sheep dip, it being necessary to use the powder dip, to keep it well stirred, and by means of an engine or other adequate power to maintain a sufficiently high pressure to ensure the powder being carried right through the wool into the skin. The above treatment had several advantages over dipping. A large number of sheep could be treated in a very short time. A light portable plant could be taken from place to place, and the sheep treated out in the paddock, anywhere a yard was available, obviating the necessity for driving sheep to a dip. While dipping was not always safe under certain conditions of weather, no harm could be done by the strong jet unless the sheep were heated.

PORT PIRIE (Average annual rainfall, 13.21in.).

May 5th.—Present: seven members and one visitor.

CURING BACON.—A paper dealing with this question was contributed by Mr. H. Johns. He said pigs should be killed preferably at a weight of about 130lbs. The animal should be killed on a cold night, if possible, as that gave the meat a chance to set firmly. After cutting up the two sides and hams, they should be put in a cool place and sprinkled with pure salt; that would remove all bloodstains. To prepare the mixture for curing, 6lbs. salt, 3lbs. brown sugar, ¼lb. pepper, ¼lb. saltpetre, and ¼lb. soda were necessary. The mixture should be well rubbed into the meat. After running the blade of a long knife between the rind and the bone on the inside of the hams, the salt could be pushed down with the aid of a stick. The dressing should be applied every other night for a fortnight to the sides, and three weeks for the hams. After being taken out they should be hung up to dry. Mr. Johns expressed his willingness to demonstrate to any of the members.

WIRRABARA (Average annual rainfall, 18.91in.).

May 26th.—Present: 18 members.

STUMP-JUMP PLOUGHS.—Mr. W. Bowman, in a short paper on this subject, expressed the opinion that the plough with steel plate shares side on was the best class of implement, because one could cover twice the quantity of ground, and the shares seldom broke. Another point was that the point cut to the same depth as the wing, making a good level seedbed. That type of share enabled one to plough much harder ground, as it prevented the machine from sliding out behind. Every single-action plough should have the point of the share directly under the hinge; that would enable it to jump freely. A plough of that type would keep in the ground with a much lighter draft, because of the weight of the machine. The top pipe and spindle hinge was preferred, because it did not allow the foot to wobble. Such was not the case in older styles. A moveable draft head and lever was more easy to manipulate than one that had to be altered by unscrewing bolts. A good discussion followed.

YACKA.

June 13th.—Present: 16 members.

THE FARM GARDEN.—Mr. Forrester contributed a paper on this subject. Preparation should now be made in the manner of digging holes, &c., for the planting of fruit trees, he said. There was hardly a locality in the State in which some class of fruit could not be grown. Almonds would thrive almost anywhere, and needed very little attention. The fig tree was a reliable grower, and one of the best jams was made from its fruit. A vine or two planted around the house would produce a crop, especially if trained on a trellis. There was nothing which added more beauty or greater pleasure to the home than did a garden of fruit trees, and, circling outside of that, an avenue of gums and pines. Good discussion followed.

BELALIE NORTH, June 2nd.—Discussion took place on the Width of Tires Act. Members agreed that a lighter load did more damage to roads in winter than heavier loads in summer. Mr. Golldige reported having harrowed portion of a paddock after rain at the time of last haymaking. Wheat sown on that during the present season came away much more quickly than that on the portion not so treated. Mr. O'Leary advised frequent harrowings, using this implement even after the wheat was up.

BLYTH, May.—Mr. W. O. Eime introduced a discussion on the mice plague. He said the problem was very serious. Discussion followed, in which Mr. McEwin advised sowing at the time in preference to delaying seeding, as the mice generally did more damage in the latter part of the season.

BLYTH, June 2nd.—A discussion on the necessity for increasing the acreage of wheat production was initiated by Mr. J. B. Turner. He read extracts which pointed out how imperative it was that farmers should produce as much wheat as possible to help to meet the heavy taxation which would be inevitable as a result of the war. An interesting discussion followed, in the course of which Mr. Bozacott and Mr. A. L. McEwin emphasized the need for increasing production.

BOOLEROO CENTRE, June 1st.—Mr. Whibley opened a discussion on the wheat best suited for this district. He spoke in favor of Federation. Mr. Nottle, sen., thought that Federation might, in time, run itself out and deteriorate. After a lengthy discussion members were unanimous that Federation was the best class of wheat for that district.

NARRIDY, June 9th.—MICE PLAGUE.—It was reported that from 30 to 40 horses had died. Mr. Loxton (veterinary surgeon) who had visited the district, attributed the loss of horses to the prevalence of mice in haystacks. Several farmers were unable to start seeding.

LOWER-NORTH DISTRICT

(ADELAIDE TO FARRELL'S FLAT)

GAWLER RIVER (Average annual rainfall, 17in. to 18in.).

June 4th.—Present: seven members.

SHEEP.—Mr. W. J. Dawkins delivered an address on the breeding ewe, her breed, care, and management. After dealing with the most suitable breed of sheep for the farmer, he mentioned that he began shearing at the end of August, as he had found that whilst several sheep may be lost whilst they were in the wool, this risk was not entailed after they had been shorn. He would put the rams with the ewes at the end of November. Two months previously they should have been provided with exercise by being put in a fallow paddock to run off surplus fat. The flock should be yarded once or twice a week from the middle of December, and the ewes breeched at the beginning of May. The flock should be inspected twice daily when lambing commenced, the ewes and lambs being drafted as they came. The lambs at the end of a fortnight were ready for tailing. It was advisable to change paddocks as often as possible, and lambs marketed should be even in type.

THE BREEDING EWE.—A short address on this subject was given by Mr. W. J. Dawkins. He thought the breed best suited for farmers was the Border Leicester half-breed ewe mated with a Dorset Horn ram, as the lambs matured very quickly. He was in favor of early shearing, beginning at the end of August. Annual dipping of sheep should be made compulsory, as it checked the damage caused by the blowfly. The rams should be put with the ewes towards the end of November, having previously had a couple of months' exercise in a fallow paddock to run off surplus fat. May was a good time to breech the ewes and keep them clean. The flock should be watched closely at lambing time, and the ewes and lambs draughted as they came. If a ewe lost a lamb it was well to let another lamb give relief to her. When a fortnight old the lambs would be fit for marking. They should be changed as often as possible into different paddocks until ready for market, when they should be picked out in even lots.

LONE PINE.

June 5th.—Present: 25 members and four visitors.

MANAGEMENT OF THE ORCHARD.—In laying out an orchard the first consideration was the soil, said Mr. J. B. Hoffman in a paper on that subject. The soil in that district was more suitable for apricots and plums, although there were parts where apples and peaches would do well. Apples and peaches require a darker and more loamy soil to produce good fruit and good crops. An orchard should be well ploughed, well scarified, and well weeded. When planting trees the holes should be dug at least 15in. square, and 1ft. deep. A tree should never be planted deeper than it grew in the nursery. Trees should not be closer than 20ft. by 20ft., if closer it was difficult to work the land. Apricots should be grafted on apricot or peach stock, peaches on peach or almond, plums on plum, peach, apricot, or almond; on almond stock, only certain kinds of plums would do. Apricots and peach trees should be pruned every year. After having been shaped a plum tree required very little pruning. Summer pruning helped in setting fruit buds, and would spare time in winter. Summer pruning should be done as soon as the fruit was picked.

Winter pruning could be started as soon as the leaves had dropped. Sound trees and clean fruit could be obtained by making use of the spray pump. Spraying should be done just before the buds opened. In using bluestone and lime, or Bordeaux mixture, care should be taken not to make it too strong, as it would burn the fruit buds. If old apricot and peach trees were cut right back in the old wood they would produce young, healthy wood, and in a few years bear fruit again. When planting fruit trees a little bonedust added would help the tree along. If an old fruit garden did not bear too well some stable or artificial manure should be used, stable manure being by far the best. A general discussion followed the reading of the paper, in which Messrs. D. Lehmann, R. Neldner, and J. E. Minze took part.

NORTHFIELD (Average annual rainfall, 19in.).

June 5th.—Present: 10 members.

ERECTING A STABLE.—This was the title of a paper given by Mr. W. J. Dall. In all cases where possible he would erect the stables facing the east, he said, preferably with stone walls and a thatched roof. That would be warm in winter and cool in summer. Although there was a danger of fire with the thatched roof, it was not so great as was the case where the stables were roofed with loose straw. The chaff shed should be situated in the centre of the stable, and allowance made for a passage way between the manger, to facilitate feeding. The floor should be paved with wood or bricks, stones being too slippery and hard. If the trough was in the stable yard, the horses would spoil the water. Conveniences for harness were made on the partition posts of the manger. An open stable was more healthy, and he preferred the horses tied up. In discussion all members favored the brick floor. Messrs. Chardon, Neely, and Chandler spoke, and expressed a preference for the stable with a loft. Mr. Neely thought the horses should be left loose, and he did not like the open style of building. Messrs. J. Eisle, Goldney, Warden, Sandercock, Cowle, and Kelley each took part in the discussion which followed.

SALISBURY (Average annual rainfall, 18.57in.).

June 5th.—Present: six members

THE CARE OF VEHICLES.—In presenting a paper on this subject, Mr. F. W. Sayers said :—In the first place, we need sheds or buildings to suitably accommodate all our working plant. Have all things possible under cover, and not needlessly exposed to the weather. The most illused vehicles are the wagon and the tip dray. Perhaps this is owing to their being so heavy and awkward to place under cover. The life of these vehicles can be lengthened materially by applying oil, or paint, or both, to preserve the wood, and if a screw wrench be applied to the nuts a little more frequently than is usual, the wear and tear would be lessened. When anyone is in want of a new wagon (the same thing applies to any other vehicle), it is a good plan to go to a good reliable builder and have it built to order. By doing this one is assured of securing a much better article, and one most suitable for the work. Stipulate, above all things, well-seasoned timber only to be used. The whole secret lies in the timber that is used. Good well-seasoned timber costs considerably more, but we should not take too much exception to it (within reason, of course). The builder has to allow for interest on his outlay, and rent for storage. Timber for this purpose needs to be stored for a number of years, and I am of the opinion that the builder of a good reliable article deserves all he gets. As an instance, we might pay anything from £10 to £20 for a spring dray, but we must not overlook the fact that there is a vast difference in the materials used. Then, again, we must expect to pay for good workmanship. We learn by experience that the cheaper article is more likely to need repairs. We desire to secure something that will last for a number of years, and to consider not only the cost of repairs, but the loss of time in going to the builder and blacksmith. It is my intention to deal mostly with the wheels, because I contend that they are the principal wearing parts on any vehicle. I would recommend the application of at least two coats of oil on the wheels before they are painted or varnished, whichever the case might be. After being in use for a year, or perhaps two, the tyres may need cutting and shutting. In treating the wheels, instead of merely cutting and shutting the tyres, the boxes should be removed from

the naves, in order that the ends of the spokes may come down as far as possible. Each spoke should be wedged at the rim to secure the proper size, in order that they each may have an equal bearing. The operation involves increased outlay, but it makes a much better wheel. Work of that character should always be done in the hottest weather, when the wood is well shrunk. When this matter has been attended to, choose dry weather, preferably hot, place your vehicle under cover, if possible in an enclosed building, thus avoiding dust. See that all dirt is removed and all roughness taken off with glasspaper and elbow grease—more of the latter than the former. Secure only sufficient fresh raw linseed oil for present requirements. If the wheels are light in weight, take them off the axles and put them on a wheel horse, or a piece of inch pipe through a post is just as effective. If heavy wheels, it is as well to block up the axles, so that they can be turned around with ease. Having the wheels ready, and some oil in a receptacle similar to a billycan, a firepot is required to keep the oil hot; but avoid, above all things, allowing it to boil. The idea in warming the oil is to make it as thin as possible, to penetrate well into the wood at the joints. If allowed to boil, it becomes stiff like varnish, and is not nearly so effective. The same thing applies to stale oil—that is, oil that has been exposed to the air. Apply the oil as quickly as possible to the spokes around the naves and felloes. Allow it to stand at least one day, then wipe off any surplus oil with a dry rag, if the wheel is a painted one. If varnished, it is as well to use a rag dipped in turps, in order not to weaken the varnish when applied. It is always a good plan to paint or varnish after oiling, insuring that no oil escapes. If this plan is resorted to at intervals of every few years, tyres should never need cutting and shutting. There will be a saving in expense, and the possession of a much more solid and reliable wheel. Another good well-known method is to place hot oil in a trough, in size according to the radius of the wheel. For small wheels a short piece of ordinary guttering, with both ends blocked, is a simple method of making a trough. When the felloes are deep and wide, a much larger one is necessary. The trough, with sufficient oil to cover the felloes, should be placed under the wheel. The wheel should be revolved, at first quickly, then slowly. This is to facilitate evenness of swelling or tightening at the joints. The spokes around the naves can be done with a brush. Although the latter method is perhaps the best, it is not nearly so economical as the first mentioned. If applied with a brush less oil is required, and is almost, if not quite, as effective. When using oil, a little applied with rag or brush to shovel handles, fork handles, and the like will not only prevent them from splitting and cracking, but will be made much nicer for handling. In painting a wagon, I would suggest mixing your own color. All that is needed for the purpose is white lead, raw or boiled oil, a little dryers or some substitute. The desired color can be obtained by adding golden ochre, umber, and sienna, all three in oil, or any other stainings to suit. The mixture will need straining through a piece of hessian. Stir the ingredients well together. Do not apply either too thickly or too thinly. Do not put too much on at one time. A little turps may be added, but use it sparingly. Turps allows the paint to work freer, but if too much is added there is a tendency to make it weak. There are several good brands of ready mixed paints on the market at the present time, but in mixing your own you know you have the genuine article, and will, in a good many instances, be more lasting. This does not apply to buggies, motor cars, or light spring drays. These being used for a much different purpose, we are apt to study appearance more than durability. Ready mixed carriage colors can be purchased, so finely and well ground, that it pays to use them. For the first coat mix your own with white lead, dry vegetable black, raw oil, and plenty of dryers and turps. Apply one or more coats of the desired finishing color that has been ground in goldsize. Thin out with turps, just thin enough to cover. The idea is to form a hard shell for the application of the varnish. If you can use a lining brush, a few lines make an improvement, and finally varnish one coat. It is a mistake to apply more, unless, of course, by a tradesman, because you are apt to get too much on, and the result may be blisters. After allowing to stand a few days, get a bucket of rain water and a good chamois leather, and wash well before being used. This is a point well worth noting. By washing with clean water, and drying with a chamois, the varnish is hardened, and the dust off the road falls off instead of sticking, as is very often the case. Never wash a vehicle unless you dry off well with a chamois, and never allow mud or dirt to remain on too long. Use plenty of water. I have always found that the more you wash varnish that is exposed to the

weather the longer and better it will keep its shine. Varnished wood should be rubbed flat or dead before applying varnish. This is easily accomplished by rubbing down with ground pumice on a piece of an old felt hat dipped in water. This will remove all grease, &c., and takes off any shine, and prevents to a very large extent the varnish from running. Exercise the greatest care in not applying too much. Use only the best of materials. It pays.

LYNDOCH, May 31st.—A paper dealing with the question of noxious weeds was contributed by Mr. W. Burge, who dealt with various useless weeds found in the State, and emphasized the necessity for stricter enforcement of legislation dealing with this matter. Members generally agreed with the opinions expressed by the writer of the paper.

MALLALA, June 4th.—BULK HANDLING OF WHEAT.—MR. A. V. Nairn initiated a discussion on this question.

WATERVALE, June 9th.—MICE PLAGUE.—This subject was discussed by members, who thought much loss could be saved if good stacking accommodation were provided at stations.

YORKE PENINSULA DISTRICT.

(TO BUTE.)

MOONTA (Average annual rainfall, 15.22in.).

June 2nd.—Present: 14 members and one visitor.

FALLOWING.—Mr. Hartley Cadd, in a paper under this heading, said with the heavier type of land fallowing should be started immediately seeding was finished, the land being ploughed to a depth of at least 4in. As soon as the ploughing was finished the land should be cross-harrowed with fairly heavy, well sharpened harrows twice. When the weeds showed up nicely a cultivator or skim plough should be put on; if the latter were used the mouldboards should be removed. The cultivator, or plough should be put to the full depth of the ploughing. Later, when the ground showed signs of crusting the harrows should again be put on. If good spring rains were experienced a second crop of weeds would present themselves. These should be cut off lightly with a skim plough with the mouldboards removed, care being taken not to do the work when the ground was dry. Again, if the surface caked the harrows should be put on. The result aimed at in fallowing was conservation of moisture and germination of weed seeds. If the job were properly done both ends were gained. Care should at all times be taken not to work the land when it was at all boggy, or when dry. It was difficult to fallow sandy land without causing it to drift, thereby spoiling the land itself as well as the fences, roads, &c. Grass and stubble should not be burnt off, but as much as possible should be ploughed in. To do that properly a disk plough was necessary. The fallow land should not be touched until the weeds had grown up well, when it should be lightly ploughed, but even then only when the land was nice and moist. Nothing more should be done, and sheep should be put on as little as possible. With that land care must be taken never to work it when at all on the dry side. Mr. A. B. Ferguson agreed that fallowing should be commenced immediately after seeding, but did not favor keeping the sheep off fallowed sand. If the ground were ploughed when in a very wet state, sheep would puck it down. He would fallow ploughed sufficiently deep to cut the weeds and turn them over, and preferred the spring tooth cultivator, or the skim plough with the mouldboard removed to work the fallow. The harrows constituted one of the most profitable implements on the farm when used at the right time. The scraper should be used by every ploughman. Mr. W. B. Stacey preferred the potato mouldboard rather than no mouldboard for working the fallow. Mr. H. J. Cadd suggested sowing peas or oats for feed on fallowed sandhills. If the sandhills were not cultivated after being fallowed it would be a much wiser plan to leave them undisturbed.

WESTERN DISTRICT.

BUTLER (Average annual rainfall, 16.61in.).

June 4th.—Present: 12 members and six visitors.

HOMESTEAD MEETING.—Mr. R. W. Phillis opened a discussion on tree planting. He thought sugar gums were best suited for the district. Mr. R. Barr was in favor of fruit trees, as besides affording shelter for stock, they could be turned to household uses, but should be fenced off to keep stock from destroying them. Mr. S. Bawden said it was not convenient for every farmer to fence trees owing to the high cost of materials. Mr. A. Hughes had planted gum trees in the corner of paddocks which he thought solved the fencing problem. Mr. G. W. Bray also had good results from gum trees. Mr. J. Owen had grown many varieties of trees from seed, including sugar and blue gums, pepper, &c. The best method was to get some old jam tins with the bottoms out, and stand them together on an old sheet of iron in order to prevent the roots from entering the ground. Then sift soil over the tins until they were well covered, drop three or four seeds into each tin, and sprinkle a little more soil over them. Sow the seeds in February, and to protect the young plants from hot winds and sun it was well to shelter them with old pieces of bagging to act as a breakwind. When the second pair of leaves appeared thin the young plants out, leaving only one in each tin, either the strongest or most central. The best time for planting out was June or July. The land should be well grubbed, and the exact site of each tree loosened with a pick, then place the tree in the ground without removing the tin.

DISCUSSION ON FALLOWING.—Mr. D. B. Butler said it would pay to put less crop in rather than miss the opportunity to commence early fallowing. He favored the share plough, as it took more stumps from the land. Mr. A. H. Pfitzner spoke in favor of the disk implement. He contended that most of the inferior work done by the disk plough was due to neglect on the part of the ploughman. Mr. A. Hughes believed in early fallowing, but did not advise deep ploughing. Mr. G. W. Bray said in wet seasons he would fallow to a depth of 3in., and work back in September, late fallow should be ploughed shallower. Mr. C. Z. Jericho favored seeding in June and fallowing during July and August, doing all one could to keep the land free of stumps and stones.

CUMMINS.

June 2nd.

POULTRY.—Mr. W. Blucher contributed a paper on this subject, in the course of which he stated that eggs at 6d. per dozen were more profitable than butter at 1s. per lb. Each farm should carry 150 head of poultry of pure breed. He then gave a few points dealing with the question of breeding, and advised hatching chickens between July and the middle of October. As there was only a small market for table poultry in that district he advised paying attention to the laying strains of fowls, suggesting the Leghorns and Minorcas as suitable breeds.

ELBOW HILL (Average annual rainfall, 11in. to 12in.).

June 2nd.—Present: 14 members.

STATE FLOUR MILLS.—The Hon. Secretary (Mr. H. J. Wheeler) in discussing the subject of State flour mills in a short paper, said, "Australia being a producing country, one of the most important questions is the disposing of her products. The great difficulty in the producers' light is the distance from the markets of the world. At the present time the cost of marketing overseas amounts to nearly as much as the producer receives. Thus he only receives about half of the price the consumer pays for the produce. We pay enormous freights to have our wheat lifted to oversea markets, when it could be gristed here, and the flour exported. Australian flour can command a ready sale, and by shipping flour instead of wheat 20 per cent. to 30 per cent. of the shipping space would be saved. We would retain the mill offal in the country to feed stock. The producer pays high prices for the bran and pollard of his own growing, because he sends the bulk of these commodities to other countries, to cheapen their value there. State flour mills would provide labor for all time, have the result of circulating more money in Australia, and tend towards a more direct exchange of foodstuffs. To take up a universal system of gristing we must have a working scheme. While it is not essential that this should be taken over solely by the Government, the Government should advance,

foster, and protect the industry. Money should be available from the Government to bodies of producers for the purpose of starting mills under Government supervision until paid for, in all ports that can show an average of 150,000bush. of wheat per year for a period of five years, providing a sufficient number of applicants guarantee to support the mills with 75 per cent. of saleable wheat. All wheat would be gristed on a "per bushel" basis, and the flour would be pooled, while the farmer would, at his option, retain part or all of the offal. Mr. G. C. Dunn expressed the view that wheat could be exported more profitably than flour. Mr. T. Wildman favored a State system of gristing. Mr. R. T. Mills approved of State-assisted flour mills. He thought the prices of bran and pollard ruling at present were too high, and State mills would reduce the prices, and so make it possible for the farmer to feed bran and pollard to his stock with profit. Messrs. G. F. Wake, A. C. Dawkins, and J. V. Wake disapproved of State-owned mills.

MILTALIE (Average annual rainfall, 14.55in.).

June 2nd.—Present: eight members.

BY-PRODUCTS OF THE FARM.—In a short paper dealing with this subject Mr. Story said first to be considered was the keeping of a few sheep, which could easily be looked after, and were a reliable source of income. Cows were profitable, provided one was able to look after the number kept. Fowls and pigs did not require very much attention, and besides providing food, could also be turned to monetary account. In discussing the paper Mr. H. R. Jacobs favored sheep as being the most profitable sideline. Mr. T. J. P. McEachen considered that poultry were most remunerative. Mr. J. W. Story thought cows, pigs, and poultry were a source of revenue in many ways. Besides being available for sale they provided food for the household. Mr. E. Story gave preference to cows and raising calves, but would also keep sheep, pigs, and poultry. The Hon. Secretary (Mr. W. E. Hier) considered poultry as being most profitable, but did not advise keeping ducks. Mr. J. Aunger spoke in favor of pigs, but he thought it unwise to house them far away from the homestead, as time was wasted in that manner.

MINNIPA.—June 2nd.

ENSILAGE.—Dealing with this subject in a short paper, Mr. A. Elefson mentioned that green stuff preserved in the shape of ensilage was of considerable value as a standby in the winter months. It kept stock in good condition, and maintained the milk supply. Any green stuff that the stock would eat could be preserved in this manner, either in underground silos or in the shape of a stack. In the course of the discussion, it was mentioned that properly cured ensilage was less weighty than the same bulk of material grown, and also that there was a greater proportionate loss on the stack of ensilage than from a stack of hay.

SALT CREEK.

June 2nd.—Present: 12 members and two visitors.

SKIM CULTIVATOR V. PLOUGH.—In dealing with this subject, Mr. George Barber said he had found the 12-furrow cultivator plough a more successful implement than the six-furrow plough. The latter had a tendency to turn up the earth and leave it very rough, which hindered the harrows from making a good clean job, whereas the cultivator, with 7in. shares, would cut the ground and leave it close and even, thus encouraging weed seeds to germinate. He found the harrows did better work after the cultivator. Seeing that the land was cultivated three times before seeding, it was unnecessary to use a heavier implement when a lighter one did the work equally as well. The land appeared to hold moisture better after the cultivator, as the plough left the work too open. Especially where the land was very dirty, and needed a good deal of working, was the cultivator most successful. Good discussion followed, in which members generally agreed with the speaker. Mr. Barber asked if anyone had experience with the drill attachment on the plough? Members replied that only on level ground were the attachments a success.

YADNARIE (Average annual rainfall, 14.09in.).

June 2nd.—Present: seven members and two visitors.

HINTS FOR EMPLOYERS.—In a short paper on this subject, Mr. C. E. Kruger said one of the main causes of the difficulty in obtaining farm labor was the want of a better understanding between master and man. Some employers would

have their men working at all hours and in all weathers. Employers should treat their employees as they would like to be treated were the positions reversed. Bad treatment and the lack of good accommodation tended to make farm labor scarce, which necessitated high wages. A half-holiday given to the men occasionally during the slack season would be well repaid in harvest and seeding operations. Members in discussion unanimously agreed that employers would get better results if the men were better cared for.

BUTLER, April 30th.—HOMESTEAD MEETING.—Mr. Spafford gave an interesting address on the subject of soil cultivation and manuring.

KOONIBBA, June 7th.—The Hon. Secretary (Mr. E. O. Dahl) read an extract dealing with certain classes of wheat grown in Victoria. Several kinds of wheat were named as being frost-resisting, and it was resolved to ascertain if such wheats were obtainable from any of the experimental farms in this State.

PENONG, June 9th.—A general discussion took place on the prevention of smut in wheat, as a result of extracts being read by the Hon. Secretary (Mr. O. J. Murphy). Mr. Stiggants mentioned that seed sown by a broadcasting machine was less likely to be affected by smut than seed sown through a drill, probably because the latter machine tended to break up any "bunt" balls in the seed. He also stated that affected seed, sown by a broadcaster, which had lain on the ground three or four days before being covered, frequently produced a cleaner crop than seed covered immediately after sowing, especially in damp weather.

EASTERN DISTRICT.

(EAST OF MOUNT LOFTY RANGES.)

BORRIKA.

June 2nd.—Present: 15 members and three visitors.

QUESTION BOX: ANNUAL MEETING.—Various questions were discussed. Mr. Huxtable said barley was very liable to smut, and advised members to pickle before sowing. Opinions were divided as to the quantity of oats to be sown per acre. Mr. Hart had sown 50lbs. to 60lbs. of super. to the acre, and then altered to 100lbs., and had not noticed any marked difference, but Mr. Green disagreed. Mr. Bonython favored pickle mixed at the rate of 1lb. of bluestone to 10galls. of water, which gave good results. The Hon. Secretary (Mr. O. F. Bauerochse) then read the annual report. The previous meeting also took the form of a "Question Box," and good discussion on various topics took place. The likelihood of the development of takeall after the ploughing under of stubble for fallow, the use of drake as a fodder, the pickling of oats, and the question of rotation of crops, were debated at length.

MONARTO SOUTH (Average annual rainfall, 14in. to 15in.).

June 2nd.

SKINS AND HIDES.—The Chairman (Mr. G. Patterson) contributed a paper on the care of skins and hides. He said, "If skinning a cow or bullock, avoid cutting the skin, as every cut that is made in the hide detracts from its selling value. When the hide is taken off it is a good plan to spread it on the barn floor or some other suitable place. After being salted and left over night, it can be rolled, put in a bag, and marketed. Coarse salt is satisfactory for hides, and it is much cheaper than table salt. Care should be taken in skinning sheep. After opening up, use the knife as little as possible in taking off the skin. Leave the trotters on, as they help to stretch it into a better shape while drying. Cuts lessen the value of the sheepskin. When the skin is taken off, it should be thrown lengthwise over a straight thin rail or tight wire under a shed. Under cover, skins dry more slowly. If they are hanging over a rail, as suggested, if desired, one could tie the trotters together, and put another piece of wood through as a weight, which would help in stretching the skin. If kept any length of time the skins

should be painted over with a wash to prevent weevil getting into them. Never throw skins one on top of another, as that seems to encourage the weevil to attack the skins. Never hang them on a wire fence to dry."

PINNAROO (Average annual rainfall, 16.74in.).

June 1st.—Present: 18 members and two visitors.

KEEPING FARM ACCOUNTS.—Mr. F. G. Bonnin supplied a paper dealing with the subject of farm bookkeeping. He said :—"Before reading this paper, I wish it to be clearly understood that I am not, by any means, an expert bookkeeper myself, and can therefore only attempt to give you an outline of the methods I employ, and which I have found very satisfactory so far, and which I think can be modified, as circumstances suggest, to suit almost any requirements of an agriculturist. There may, however, be many other methods equally good, and perhaps better than mine; but I am forced to confine myself to the ones of which I have some slight knowledge. Let me say here that no one can possibly hope to become an adept at keeping accounts without a considerable amount of experience and practice. To the beginner, as a rule, the work is somewhat muddling; but after some time has been devoted to it, he will grasp the reason for things much more easily than he could at the start, and will be able to reason out any problems he may meet, if he apply commonsense and a little patience. The method of bookkeeping I use for the money side of the business is known as the "double entry" system, and for it two books are necessary, a journal, or day book, and ledger. A separate cashbook may be kept in conjunction with them, if so desired, but is not essential. The day book is in reality a memorandum of all moneys received and spent, and it shows to which accounts they must be subsequently entered in the ledger. This book must be kept up to date at all times, otherwise mistakes and omissions will creep in, and render the work practically useless. Once an entry is made in the day book it is safe, and can be posted up in the ledger at any convenient time. All cheques drawn are listed in the day book, being copied in from the heels of the cheque book. The ledger contains my own private accounts, and also the accounts of the various firms and persons with whom I have any dealings, and to keep it correctly there is one thing that must always be remembered, and it is this, that for every credit shown on one side there must be a corresponding debit shown somewhere in the ledger on the other side. If this rule is carefully followed, the books will always be found correct, and the accounts will balance. My own private accounts, which are all debtor accounts, show all disbursements of money on the farm, grouped under different headings, which I have divided up and named to suit my own requirements, and also to fit in with those of the income tax returns, and so save time and trouble when they have to be made up each year. For instance, take the house account, which includes all living expenses. This shows at a glance how much has been spent on the housekeeping over any required period, all the various storekeepers' accounts for food, &c., being grouped together on this page of the ledger. Then we might consider the wages account, which records how much money has been expended in wages over any given time, and also to whom the payments have been made. Other accounts appearing in my books are plant account, stock account, seeding account, harvest account, freight account, fodder account, and so on, each showing the various items of expenditure under their own particular headings. The number of these private accounts can be increased indefinitely to suit individual needs, but the greater the number of accounts the more work required in keeping them. It is therefore a great advantage to keep the number as small as possible without detracting from the usefulness of the work. To try and make plainer the way in which the accounts go through the books, I have set down two examples. Suppose William Smith has worked 10 weeks for me at £1 per week, the entry in my day book would appear as follows:—Wages account to W. Smith—10 weeks at 20s., £10. That means that I debit my wages account in the ledger with £10, and credit W. Smith's account with £10 for work done. When I pay Smith a cheque for £10, it is debited to his account, which at once balances, showing £10 on each side. The way in which the wages account will balance, if desired, I will endeavor to explain a little further on. As another example to show how a storekeeper's account may be split in my ledger, I have taken the following figures. Say I go to Brown & Co.'s store and buy the following goods:—1 bag flour (house

account), £1; 1 bag bran (fodder account), 10s.; 1cwt. wire (fencing account), £1 10s.; 100 cornsacks (harvest account), £5. The entry appears in the day book as follows:—

Sundry Accounts to Brown & Co.

	£	s.	d.
House Account—1 bag flour	1	0	0
Fodder Account—1 bag bran	0	10	0
Fencing Account—1cwt. wire	1	10	0
Harvest Account—100 cornsacks	5	0	0
	8	0	0

Each item is debited to its own account in the ledger, and Brown & Co.'s account is credited with £8 in a lump sum for goods supplied. As soon as I pay the cheque for £8, Brown & Co.'s account is debited with it, the account balancing. In conjunction with the afore-mentioned accounts, I keep a cash account for small amounts not paid by cheque, and also a bank account, in which all moneys paid in are debited to the banks, and all cheques drawn are credited to it. I said before that all my private accounts are debtor accounts, *i.e.*, they show on one side only of the ledger. To balance these accounts, if it is desired, a general account is used. In the general account, all the various debtor accounts are shown together on the debit side of the ledger, and the cheques drawn in paying the different accounts go down on the opposite side, and if all entries are correct, the amounts must, of course, balance each other. I keep also a produce account, in which I show all sales of grain, hay, stock, and dairy produce, &c., this account being all credits. I could write a great deal more on this part of the subject, but time would not permit, and I am doubtful if I would make it any clearer; one must have had practice to thoroughly grasp it. Besides the money side of the books, I keep a diary, in which I note down what I and my men are doing each day. By doing this, I can at any time get the exact cost of any particular piece of work should I so desire. At seeding time I record the number of acres drilled each day, and also the quantity and variety of seed being sown, and the amount of super. being put on per acre. Then, at harvest time, I keep careful count of all bags of grain, and show the number of bags in each wagonload, the weight of same, and to whom it was delivered. I also make a note, after cleaning up, of how much each particular crop and paddock yielded. I make all these notes on the blank pages at the end of the diary. I also jot down in the diary the dates on which each man I employ started and finished working for me, together with rate of wages being paid. I think it advisable also to set down the history of each paddock or piece of land cropped on the farm each year. If the paddocks are permanently fenced off this is easily done in a special note book kept for the purpose. In new land, however, where fences are only temporary, and sometimes shifted, I find it very handy to make a small plan of the block each year, showing the situation of the various paddocks at the time, and how they were worked, whether under crop of some kind, fallow, or pasture land. The ploughing, drilling, and reaping dates can be shown on this, if desired. It is advisable to keep lists of all stock on the farm, and to show the dates on which numbers are increased or decreased, and also to put down the dates when female stock are served by the male, and when the young are dropped. That concludes the list of records which I keep myself, but it can, of course, be added to at any time as seems necessary. In conclusion, I would say that every farmer should keep books, so that he can at all times get at his exact position financially, and also save endless confusion in making up Government returns, which are becoming more numerous and more complicated each year. Let it be remembered that bookkeeping, to be of any value, must be accurate, and therefore my advice is—Leave nothing to chance, and trust nothing to memory; get every transaction down in black and white as soon as it is completed. This applies very particularly to all money matters, which are always the greatest source of error if not kept right up to date.''—Mr. P. J. Edwards (Chairman) emphasized the wisdom of recording matter in a diary. Mr. E. H. Parsons advocated the paying of all accounts by cheque, and that to order; by that means one was less liable to lose sight of debits. Mr. T. B. Shiels remarked that the system as outlined by the writer would be most up to date in many business houses, and if carried out on all farms the farmers would be the better able to locate their financial position. One item overlooked by the writer was the taking

of stock each year; that would require the opening of a "Capital account," which would set out the value of plant, *i.e.*, after making due allowance for depreciation by wear and tear, the reduced value of livestock, &c. Mr. McIntosh kept various farmers' accounts, and he thought the scheme as suggested in the paper, from an accountant's standpoint, would work admirably for the most complicated of farms. He would not advise anybody to do without a cash book. That could be made a book of valuable records, and if ruled in a proper way would indicate at a glance the state of accounts. He urged all farmers to keep a record of wheat deliveries.

POMPOOTA.

May 23rd.—Present: 35 members.

CITRUS CULTURE.—In dealing with this subject in a paper, Mr. H. J. Darwent (Fruit Inspector) said:—"In those parts of the State exposed to high winds and frost, the question of the site for the citrus grower is very important, and the orchard should be planted in the best protected position. High winds can, to a great extent, be overcome by planting windbreaks, but frost is far more difficult to combat. Lowlying spots should be avoided, as it is well known that cold air always finds its way to the lowest part, and it is there that we find most damage done. The best position is one having an eastern aspect, where the sun is upon it as soon as it rises. Trees hidden from the sun until it is up long enough to attain a considerable heat are most damaged after frosty weather. If it is not possible to secure an eastern aspect, select a place on sloping ground, and avoid planting in the lowest part. Provided there are no obstacles to the free passage of air, then the cold air will drain away to those lower parts. Rich alluvial soils having good drainage are admirably adapted to the growth of citrus trees, and they also do equally well in the deep sandy loams, provided the drainage is good. The question of drainage in regard to the growing of citrus fruits, and in fact, all other fruits, is of paramount importance. It guards against the accumulation of injurious salts in the soil, and allows of proper aeration, thereby allowing the roots to penetrate deeper. Should hard pan be met with it is useless trying to grow citrus trees unless it is completely broken up by the use of explosives. It is better still to plant such land with some other variety of fruit tree, though the use of explosives must then be resorted to if success is to be attained. Assuming that the site selected for the grove has been grubbed and cleared, the next thing is the ploughing and grading. The work of putting down the irrigation channels is done by the Irrigation Department, and, as it is one of great importance, should be left to them in preference to the grower doing it himself. After the channels are completed it would be advantageous to put the water on the land in order that any little unevenness in the grading may be rectified. The channels should be laid down so that the rows of trees to be watered should not be longer than about six chains, otherwise it will be found that by the time the water reaches the end of the row those trees nearest the channel will have had too much water. This is the main cause of seepage. Pegging out the grove is much more important than would seem to the uninitiated. After the channels are laid down, and prior to pegging out the land, a cover crop of oats or wheat should be sown to prevent the sand drift, but the marking out of the land should be completed before the crop grows to a height which will interfere with the work. As in all work of this kind it is necessary that a base from which to work should be found—this is our first consideration. If we were planting fruit trees where no irrigation is to be done, it is a simple matter to use one of our boundaries, but on land which is to be irrigated, it is necessary to find the suitable grade along which to run the water, and there put down our line which will be the base from which we must work. The grade along the rows of trees to be watered must be neither too great nor too little. In the former case it causes washing of the soil, and in the latter the trees at the far end of the row cannot get enough moisture without overwatering those near the channel. In no case should the grade be more than 30in. or less than 24in. per five chains in this soil. Having found the desired fall or grade, we may proceed to peg out the land for planting. A wire line with the distances carefully marked by placing solder on it should be drawn across the block where the grade has been found, and a stake driven in at each mark on the line. We now have the base from which to work. Another line with the distances of the rows apart should now be drawn parallel with the channel, and stakes driven at each mark. It is a simple matter to then draw the two lines on the opposite sides to where we have used them, and so mark out the square or

oblong block, after which one line may be drawn across between the pegs on opposite sides, and the stakes put in at each mark. The trees should be planted not less than 22ft. apart on the square system. This distance allows of 90 trees being planted per acre. Twenty-five to 30ft. should be allowed for headlands. Care should be taken when planting the trees that a space of several feet round each tree be kept clear of the cover crop, so that the trees will not be robbed of moisture during the summer. Should the crop not be sown before the land is pegged out it must be drilled in between the rows of stakes so that the young trees may have shelter as soon as they are planted. A reliable nurseryman should be selected to supply the trees, and another important point is to place the order early to avoid disappointment, and so that good trees may be secured. They should be two years old from budding, and the wood should be well matured. The best stock for these areas is seedling sweet orange if the drainage is good. The best varieties are:—Oranges (Navels) Washington, Thompson's Improved, and Navelencia; other than navels, Joppa, Mediterranean Sweet, Parker's Seedling, and Valencia Late. Mandarins, Daney's Tangierine, Beauty of Glen Retreat, Emperor, and Scarlet. Lemons—Lisbon, Villa Franca. In planning the orchard the citrus trees should be planted on the top of the slope, provided the soil conditions mentioned previously are found there, stone fruits coming next, and pears in the lowest part, as they stand best the greater amount of moisture, which gravitates to the lower parts of the block. Spring is the best time to plant citrus trees, owing to there being less liability to damage from frost at that time. The first appearance of activity in the buds determines the exact time to start planting operations, so that the trees will receive no check. If growth has started, then the moving of the trees is bound to give them a check. The holes must be at least 3ft. 6in. square, and loosened to a depth of 18in. to 2ft. Should the soil be stiff after loosening to this depth, then explosives must be used to break up the subsoil, but such soil is not suitable for citrus growing. A planting board is used both for digging the holes and planting. It has a notch cut in the centre and one at each end. When digging the hole place the centre notch over the peg where the tree is to go, and while it is in position put a peg in at each notch at the ends. Remove the board and dig the hole. When planting place the board across the hole, having the notches at the end over the two pegs put in. The notch in the centre then indicates the right position for the tree to be planted. After planting the trees tie a handful of straw or grass loosely round the stems to prevent damage from the sun. Bundles gathered from the cover crop will do for this purpose. The young trees should be kept moist right through the summer. *Cultivation.*—In early winter the land should be deeply cultivated, but instead of working it down to a fine even surface, allow it to remain in a rough state, so that it will be thoroughly aerated and sweetened. Deep working also allows the manures to be placed well down in the soil. Spring cultivation on the other hand is comparatively shallow, being sufficient to bury weeds which grow. A good plan is to grow some crop between the trees which will increase the nitrogen in the soil, and turn it in, thus enriching the land at the same time as cultivating it. It is not always advisable to turn the crop in while in the green state. Allow it to become dry and partially rotted before ploughing it under, otherwise the acidity of the soil will be increased. During the summer the land requires to be well worked to maintain a layer of finely-worked soil on the top, thus breaking up the capilliary tubes and conserving the moisture as much as possible. Of course while the trees are young it is necessary to have strips of some cover crop growing between the rows to protect them. Thus this summer cultivation can only be carried out on strips on each side of the trees, the cultivation extending farther from the trees as they get older, until the trees can shelter themselves. *Irrigation.*—Deep cultivation and deep irrigation furrows will do much towards exploding the mistaken idea that the citrus tree is shallow rooted. If the moisture is only given to the surface soil, then it stands to reason that the roots will come up after it, and *vice versa*. Many object to deep cultivation on the score of damage being done to the roots. The surface roots of citrus repair damage done them by cutting with the plough quicker than any other tree, but providing the trees are planted in suitable soil, and cultivated and irrigated with the object of sending the roots down, then there is not much need to fear. Of course, if the soil is shallow, and the roots can not penetrate deeply, it would be madness to continue cutting roots ruthlessly. The irrigation of a citrus grove is largely determined by the soil conditions, and subsequent cultivation. It is essential that an even supply of moisture should be main

tained about the roots, and this can only be done by constantly testing, and never allowing the soil to become dry enough to cause the trees to wilt. Over irrigation will result in seepage, and the accumulation of salts in the lower portions of the grove, and it is just as important to guard against it, as not giving the trees enough water. The accumulation of salt may not be noticed for some time, but in dry years, when the evaporation is great, the salts held in the water in solution gradually rise as the evaporation takes place, and are concentrated in the surface layers of the soil. This may be guarded against by deep preparation of the soil when breaking up the land, and the maintenance of a deep layer of thoroughly cultivated soil during the hot season, or the growing of crops which shade the ground from the sun. All water applied to the land in irrigation contains salt, and, though it may not be sufficient to cause damage in one season, unless we provide protective measures, it is only a question of time before it impregnates the soil to such an extent as to cause serious damage to trees or crops growing on the land. During the wet season this salt is taken deeply down into the soil, only to rise with evaporation unless we can counteract it as stated above. If not, it will be necessary to put down underground drains, and though the first expense may seem large, there is little doubt but that it will amply repay the grower for his outlay as well as make a permanent provision against damage from salt. Care is required in irrigating in late autumn that forced growth may not be immature by the time the first frosts are experienced, otherwise much damage may be caused, and so it is sometimes necessary to steady the growth by withholding the water. Apply the water in deep trenches or furrows, and as soon after as the condition of the soil will allow, break up the bottom and sides of the furrows completely, so as to prevent loss of moisture. Then continue the cultivation to bring about a fine, dry tilth on the top of the grove. Soil conditions and the treatment the orchard receives between times will determine how often it needs irrigation. Sandy soils with good drainage require more frequent waterings than heavy retentive soils. *Pruning.*—The pruning of the citrus tree during its early stages is of a very light character. The lower branches may be used to protect the stem of the tree, and shade the ground from the sun, it being only necessary to remove them when they interfere with the working of the ground. Of course a clear stem of about 1ft. should be kept. Any limbs crossing others in better positions should be removed, and also any dead shoots which may appear. This latter is very rare in young trees properly cared for. Prune in early spring, as the growth sent out after the operation will cover the gaps and shelter the tree from the heat of summer. Pruning in autumn is liable to cause late growth, which is susceptible to damage by frost. Make all cuts smooth and close to the limb from which the branch is severed, to facilitate healing. Young citrus trees require manuring, which will tend to promote growth, and so require a liberal supply of nitrogenous manures. Nitrogen, in places like Pompoota, is always deficient in the soil, and the benefit derived from the fertilisers used may be greatly augmented by the growing of leguminous cover crops between the trees, and so serve a double purpose—the fertilising of the soil and increasing the humus in the soil. Humus is much slower accumulating in sandy soils than in heavier soils in colder climates. Humus is valuable because it forms the food of nitrogen-forming bacteria, which convert it into nitric acid, the form of nitrogen which is the food of citrus trees. Humus also increases the water-holding capacity of soils, and causes sandy soils to retain moisture longer. It also prevents the heavy soils becoming water-logged, as it does not allow the clay to become compact, and it prevents washing of the soil in heavy rains. There are two classes of cover crops—those which gather nitrogen, and those which consume it. In the first we may include all leguminous plants, such as peas, beans, clover, tares, lucerne, and others: in the second may be included wheat, oats, barley, rye, and grasses. If the roots of the former be examined, on them will be found nodules formed by the bacteria which enter the roots. The nodules decay and shrivel, and their nitrogen contents are taken up by the roots of the trees. The second class of cover crops increase the humus in the soil, but only return the nitrogen which they remove. They are useful, in that they have the effect of keeping the soil open. Citrus trees benefit at all stages from the application of phosphatic manures. As the trees come into bearing the amount of nitrogen supplied should be smaller, otherwise the tree will produce wood at the expense of the crop. It is now that potash should be included in the fertilisers used, to aid in the fruiting. It also improves the flavor, and the fruit keeps much better. These three

important fertilisers, nitrogen, phosphoric acid, and potash are generally found to be deficient in the soils in which citrus trees are grown in the valley of the Murray. In addition to the leguminous crops mentioned above, blood manures and sulphate of ammonia will supply nitrogen; bonedust and bone super. are best for phosphoric acid; while sulphate of potash is the form of this fertiliser which will be found best. Supply phosphates and potash with the early winter cultivation, and nitrogen with the spring working. The amount of the fertilisers will vary with the age of the trees, but more bonedust must be added than any of the others, owing to its not being so readily soluble. Bone super. is beneficial if used with the bonedust, as it is so much sooner available for the trees. *Pests and Diseases.*—The most serious insect pest known to growers of citrus trees in this State is the red scale of the orange (*Aspidiotus aurantii*). Fortunately this pest has not, so far, made its appearance on the Murray, and it is only by strict inspection of trees and fruit being sent to the river settlements that it can be prevented from gaining a foothold there. The most successful treatment is found to be fumigation with hydrocyanic acid gas beneath gastight tents, the best time for carrying out the operation being during the winter months, while the insects are dormant. For a space of 150 cubic feet use 1oz. of cyanide of potassium (98 per cent.), 1oz. of sulphuric acid, and 3ozs. of soft water. Use earthenware jars, and place the water and acid in the jar. When the bottom of the tent has been covered all round with earth, except for leaving enough room for the operator to get under, then add the cyanide *in lump form*, get out as soon as possible, and cover the remainder of the tent on the ground with soil. Allow at least three-quarters of an hour before removing the tent. The work must only be done at night or on a dull, cloudy day. It is necessary that great care should be taken in handling the chemicals, as they are extremely poisonous. Spraying with red oil emulsion is being used in some groves with varying success. No reliable tests have yet been made which will justify one in recommending the exclusive use of these oil sprays, though should it be proved that they are efficacious then the cost of combating this pest would be light, and the work much easier done. The black scale (*Lecanium olcae*) is more easily dealt with, the red oil emulsion being very effective. The trees are made unsightly by the black sooty mould fungus, which is always found where this scale is on the trees. The sooty mould is not caused directly by the scale, but is a fungus which thrives on the sweet excreta of the scale. It is usually found on trees with thick foliage, and it is necessary to thin out the trees before spraying. This will always apply to citrus trees when spraying for any pest, so that every part of the trees can be thoroughly drenched. The curculio beetle (*Otiorrhynchus cribricollis*) does a lot of damage to young trees of all kinds. As it only appears at night, growers who are not acquainted with its habits are often at a loss to know what is doing the damage to the trees. They may be found during the daytime just under the top soil layer, or if a bandage is placed round the stem of the tree they will take shelter under it. They are small brown beetles about a quarter of an inch long. They eat the young leaves and shoots, thus retarding the growth of the trees. Various traps for catching these weevils have been used with success. During the last summer the young cherry trees at the Blackwood Experimental Orchard were almost denuded of foliage by them. They were sprayed with 1lb. of arsenate of lead dissolved in 6galls. of water. The trees and ground were made white by the mixture, and next day the beetles could be seen lying dead under the trees in hundreds. Citrus trees are subject to many fungus diseases, but if taken in time and properly attended to, there is not much to fear in the climate experienced on the Murray. One of these diseases, *Ascochyta corticola*, known as lemon bark blotch, has been found at Pompoota during the past summer; no doubt it was introduced with the trees. All affected trees should have the affected spots cut away and the stems painted with Bordeaux mixture, using the winter strength. Any trees so badly attacked as to be almost girdled, should be taken up and burned. The collar rot fungus (*Fusarium limonis*) is causing losses in some parts of the State, particularly in stiff soils. The treatment is similar to that mentioned above. Citrus growing, like any other branch of horticulture, is a business which reflects the intelligence and industry of those engaged in it in a remarkable manner. Given proper attention these trees show the result as markedly as any other fruit tree, while if neglected they suffer more. And so it is useless for anyone to engage in such an industry unless he is prepared to work hard and intelligently, leaving nothing to chance."

POMPOOTA.

May 30th.—Present: 40 members.

ONION GROWING.—In a paper dealing with this subject Mr. M. O'Callaghan stated that given proper treatment there were few localities in which onions would fail to grow. A favored spot was a hill or rise receiving the morning sun. The land should be ploughed deeply; harrowed well to break all clods, then rolled in the same direction as the furrows. The finer the soil the easier the hoeing and weeding. The time of sowing varied slightly, according to the district, but Early Globe could be sown from April to June, Brown Globe from May to June, Brown Spanish July to September. Seed should be drilled in 9in. or 10in. apart, and 1in. deep; 4lbs. to 6lbs. of seed were required to drill one acre. When sowing was completed it was well to run light harrows over to cover any seed that was too near the surface. Stiff soils and soils deficient in fertility could be greatly improved by the cultivation of one or more crops previous to planting onions. Carrots were said to be the most desirable crop to precede onions. The onion required a liberal amount of plant food in the most available form. The most expensive item in onion growing was labor. The cost of labor was just as great for a crop of five tons as for 10 tons, therefore it payed to be liberal in the use of fertilizers. It was better to manure one acre thoroughly than two sparingly. A 10-ton crop removed 30.24lbs. of nitrogen, 10.31lbs. phosphoric acid, and 23.41lbs. potash from the soil. The chief tool required for the process of soil stirring was a good hand wheel hoe, such as a Planet Junior. It was absolutely indispensable. Cultivation should begin as soon as the plants showed, be repeated whenever the least sign of a crust appeared. An acre could be gone over by one person in a day. It was well to begin with a double wheel hoe, changing to a single as season advanced.' Next came hand weeding, when weeds were visible. That should be repeated as often as necessary. At the second or third weeding pull up plants in excess of a fair stand. The most important point in onion culture was harvesting. Neglect in pulling and carting might result in great damage. If mature bulbs were left in the ground, and a period of rain should follow, growth would be renewed. The second growth ruined the bulb for market unless for immediate use. Onions should be left on the ground a week or more in fine weather, and the best thing was to gather the crop and spread it thinly on a dry floor under shelter. The best method of growing onions was to sow the seed in nursery beds and transplant the seedlings in the open field. The crop would be twice, possibly three or more times as large as when seed was sown in the open. Experiments at Ohio, U.S.A., gave 100 per cent. and more increase with 14 varieties tried. A nursery bed 9ft. x 40ft., and from 1½lbs. to 2lbs. of seed was required for an acre. Seed should be in rows 12in. apart and 1in. deep, and scattered evenly. In eight weeks plants would be ready for transfer to the open ground. They would need repeated clipping, the aim being to get seedlings, the bulb of which, just above the roots, was between 3in. and 3/16in. in diameter. The job of planting an acre was equivalent to not less than 25 days' work. Transplanting so many onions might be a costly operation, but it relieved the grower of much, if not all, weeding, and entirely of thinning out. The saving in these aspects more than paid for the labor of transplanting. The rows should be 1ft. apart, and the onions 3in. apart in the row. They should be planted when the ground was freshly prepared, with the fingers alone. Trim off a part of the tops if long and slender, and the ends of the roots. The soil must be moist and crumbly. The advantages of the new onion culture were:—(1) Earlier ripening of the crop; (2) decided improvement in shape and uniformity of the bulbs; (3) quicker sale and better prices; (4) greater increased yield. Growing for seed required perfectly sound, well-matured bulbs, which should be set in furrows 6in. deep and 1ft. 6in. apart. Furrows might be 3ft. apart. Seed was ripe when the pods and the upper end of the seed stalk turned yellow, and part of pod burst open. The following insects and diseases affecting the onion crop were dealt with, and remedial methods given:—The onion maggot, onion thrip, onion smut. Any person going into onion growing in a practical manner, the paper concluded, might count upon a steady means of income, and one worthy of attention.

RAMCO.

June 4th.—Present: 10 members.

PEACH APHIS.—Mr. J. J. Odgers contributed a paper on this subject. He said with the advent of spring not only did the trees burst into fresh life, but many of the orchard pests found congenial conditions, and soon kept the orchardist busy. To

the peach and nectarine grower no pest at that time caused him more worry and constant work than did the peach aphis. That insect increased with marvellous rapidity, and the fruitgrower needed to spray every other day to keep it in check, let alone exterminate it. The first brood appeared as winged insects, and each was capable of producing a colony wherever it alighted, and in an astonishing short space of time. That brood, unlike the first, was wingless, but at once began to suck out the sap, and at the same time to throw off young, and so the process continued as long as the weather was favorable and food plentiful. Unless it was checked, fruit was spoilt, and even the vitality of the tree so lowered that it might die. At the approach of cold weather the insects laid eggs under leaf buds, bark, or other sheltered places, where they remained dormant during the winter season. The egg-laying generation thus appeared to be a means for meeting the severity of the winter and the scarcity of food. The fact that the brood produced from the eggs passed through the usual stages of insect life seemed to point to the aphis in its present type being a degenerate form of an active free-flying form of insect, and had become so degenerate from too great an ease in obtaining its food. Until the last few years it was considered that the aphis wintered in the roots of the trees, and various were the means advocated for destroying it. Some advised clearing the soil away from the roots and pouring tobacco solution on them, and then putting back fresh soil to cover the roots. Others suggested tying a bandage around the butt of the tree and smearing it with some sticky substance to trap the insects as they scaled the tree. When once on the tree the insects might be killed by covering them with a greasy film and smothering them, and the standard remedies were spraying with kerosine emulsion or tobacco solution. He had tried both, but the tobacco solution was more effective. With the kerosine emulsion there was a danger of getting it too strong and spoiling the fruit. Kerosine emulsion was made as follows:—1oz. of soap dissolved in 1pt. of water, was brought to a boil, then taken off the fire and 1qt. of kerosine added. The solution was then churned by a syringe or the spray pump until a cream-like emulsion was secured. That was the stock solution. For use, one part of the emulsion was added to nine or more parts of water, according to strength. Tobacco wash was made by boiling 4ozs. tobacco, 1lb. soap, and 4galls. of water. In spraying, one needed to be careful to thoroughly drench the insects, for the spray only killed by contact, and as they collected under the leaves it was a difficult matter to completely destroy them. He did not think that the aphis came up from the roots, but wintered chiefly in the tree, and although the trees were watched closely very few insects were noticed. He had found that spraying the trees in winter with an oil mixture spray was more effective, as one could do the work when the trees were bare, which killed the insects much more quickly. The spray could be used after the trees were in leaf, but then it must be much weaker, otherwise it was likely to burn the foliage. In the discussion which followed Mr. Darling considered curl leaf more destructive than aphis, and advised steeping the tobacco instead of boiling it. Mr. Dunning had tried many remedies, and found tobacco and soap best. He agreed that aphis did not winter on roots, and favored a winter spray.

ROSY PINE.

June 6th.—Present: 12 members and one visitor.

CAN WE PRODUCE MORE ON OUR FARMS.—In a paper dealing with this topic, Mr. Schiller said the increasing cost of labor, taxes, and the almost prohibitive prices of some of the machinery during the last few years made it essential that each farmer should produce as much from his land as he possibly could. Practically the whole of that district was devoted solely to the growing of wheat. Sheep could be well and profitably kept on much of the land while it was lying idle. The land benefited in no small degree when sheep were grazing on it. The droppings replaced some of the plant food constituents that had been taken out by successive cropping, and fallow land was kept much cleaner. Then one had one's own mutton to kill, and lambs, which were a good source of revenue. Wools, also, at present prices, added another item to the benefits derived from keeping sheep. Pigs, cows, and poultry, each with their products, were well worth the consideration of every farmer. Good discussion followed, and members agreed with the paper.

WILKAWATT (Average annual rainfall, 16in. to 17in.).

June 2nd.—Present: 10 members and one visitor.

MIXED FARMING.—In a paper on this subject, Mr. D. F. Bowman said that farmers ought not to restrict their attention solely to the growing of wheat. Cows, fowls, and pigs, well cared for, were a good and reliable source of income to the farmer. Sheep should also be kept, as they helped to keep one's fallow clean and supply meat for the household.

TREATMENT OF FALLOW.—This was the title of a paper read by Mr. W. J. Taylor. Fallowing should commence directly seeding was finished, not spelling the horses, as was done in many cases, the best idea being to get the fallowing done as early as possible, and then give the horses the rest they had earned. Paddock feed also would then be much stronger. Ploughing should be done to at least a depth of 3in., and if one had the strength, 4in. deep. That would pull out many stumps that would otherwise be missed. A leaf of harrows fastened behind the plough would smooth the ground and help to bring a few stumps to the surface. Keeping the fallow clean was also an important factor, and, if possible, sheep should be kept. Harrows and spring cultivators made a good substitute. September was generally the best time in which to work the fallow with a cultivator, crossing the furrows to a depth of 1½in. to 2in. The land should be harrowed after rain of, say, ½in. up to the time of seeding, to conserve as much moisture as possible. After seeding it should be harrowed once more and the crop allowed to grow slightly before rolling. Another paying proposition was to get a crop of peas off the fallow. Those put nitrogen and humus into the soil, of which the white sand land was practically devoid. Early next year one could cultivate and drill in oats. The writer of the paper also considered that would help to eradicate "take-all." Good discussion on both papers followed.

WYNARKA.

June 2nd.—Present: 10 members.

QUESTION BOX.—Various questions were submitted to and answered by members. Mr. T. Yeates considered the stump-jump plough with bridle draught was the most severe implement on horses' shoulders. Mr. Richardson considered a disc plough with spring draught harder. Mr. Beck stated that harvest implements had given him the most trouble, probably due to the hot weather. Mr. J. Boyce advocated drilling to a depth of 1½in. to 2in. with land in its present moist condition. Mr. Rackham favored deep drilling in a wet season and shallow in dry weather. Mr. Hood considered that shallow seeding was more liable to a setback if a dry spring followed. Mr. Schultz thought that horses rugged and turned out at night did better than those stabled and not rugged. Mr. Yeates agreed, and Mr. Beck mentioned that after two years' experience with rugs, he was a strong advocate of the practice. Members then discussed the relative values of standard super. and super. B. "An Advantage of a Housewife on a Farm" was the title of a short paper contributed by Mr. V. Close.

BRINKLEY, June 4th.—Mr. W. Pearson read an extract from the *Journal of Agriculture* on the report of the Veitch's Well Experimental Farm, dealing with the different results obtained from the various quantities of seed and manure sown. He advised members to experiment with various kinds of grass seeds to find out which were most suitable to grow on the poorer classes of soil or land not adapted for cereals.

HALIDON, June 6th.—A general discussion took place on the best means of destroying mice, the consensus of opinion being that the more satisfactory steps to take were to sink kerosine tins level with the ground close alongside haystacks, and poisoning by means of poisoned wheat.

KI KI, June 4th.—ANNUAL MEETING.—Members discussed the best means of coping with the rabbit pest, after which election of officers for the ensuing year took place.

POMPOOTA, June 13th.—An address dealing with the principles underlying pruning was delivered by the Horticultural Instructor (Mr. George Quinn), and subsequently that officer gave a practical demonstration on pruning young deciduous and citrus trees and vines.

SOUTH AND HILLS DISTRICT.

BLACKHEATH.

June 2nd.—Present: 11 members and nine visitors.

CULTIVATION OF SOIL FOR WHEAT GROWING.—Mr. E. H. Pym contributed a paper on this subject. He said in this immediate locality one had to deal with the fact that in an average season the ground was too wet and in places too boggy, which made it difficult to put the whole of the seed in at the best time. This could, to an extent, be overcome by the farmer fallowing more land, as the land that had been fallowed the previous spring stood more rain, and would produce better crops. It might be said that the land in that locality was not suitable for fallowing. He did not agree with that idea, although patches might drift slightly, it would not do so to any harmful extent. It had been proved and tested throughout the State that fallowing was most necessary, and also an important factor in the preparation of soil for the growing of wheat. In the first place it was not advisable to fallow too early, but to allow the weeds to be well forward and then to plough as deep as the soil would permit. The fallow should be worked at least once before harvest and once again before September, not so much with the idea of conserving moisture as to open up the ground to the energies of sun and air. Sheep should be kept on the fallow as they helped to keep weeds in check. Although recommending one to work the land with a good cultivator he would not do so while it was in a dry, powdery state. Better germination and growth would result if a good seed bed were prepared for the grain. The harrows also should be used wherever it was deemed advisable, both before and after the drill, with the exception of those parts that were boggy or set from excessive rain. A disk drill was more useful in that district, unless the ground were very clean. Superphosphates in larger quantities could with success be put into the ground, and from recent observations and experiments better results would be obtained. Discussion followed.

BLACKWOOD (Average annual rainfall, 27in. to 29in.).

May 21st.—Present: 13 members.

IRRIGATION WATERS.—Mr. W. L. Summers dealt with the subject of irrigation waters in the following paper:—"As most of the members are directly interested in the use of water for the growth of crops a few notes on the effect on the land and crops of water containing more or less salts may be of value. In using the term salts, it is intended to cover the various carbonates, chlorides and sulphates usually found in water, and not to refer solely to salt as usually understood, namely chloride of sodium. The question as to whether the continued application of any water to the soil will have an injurious effect depends upon several factors in addition to the actual quantity of salt contained in such water, for instance the chemical and physical condition of the soil, climatic conditions, the nature of the crops grown, &c. If the soil is a light to good loam overlying a subsoil that permits of fairly free under drainage it would be safe to use water containing such a quantity of salt that would quickly prove disastrous on a soil with retentive or ill-drained subsoil. In the former case the surplus water drains away underneath, carrying with it considerable quantities of salt, and in the winter the natural rainfall washes out further quantities of salt, thus preventing any accumulation in the surface layers. On a badly drained soil the surplus moisture is evaporated from the surface, leaving behind the solid contents, and besides any salts naturally in the soil will gradually accumulate in the surface layers. In such a soil it is easily possible by the excessive use of even good water to bring about such an accumulation of salts in the surface layers as to seriously affect its productive capacity. If the soil is naturally free from injurious salts a 'saltier' water may be used with safety than would be the case with a soil naturally approaching the danger limit in regard to salt. Then climatic conditions have an important bearing on the question under review. In this district, for instance, with a 28in. rainfall there is naturally much less risk of the salts accumulating in well-drained soils than in a district with, say, 19in. In our case we apply less water calculated in acre inches than falls on the land from the clouds; in the other the grower applies, as a rule, at least twice as much artificially as the land receives naturally. Though not directly connected with climatic conditions, we have to consider the possibility, either in the winter or early spring, of being able to supplement the beneficial effect of the rain by flooding the land with water containing comparatively little salt, and leaching out the injurious

salts which may have accumulated during the previous summer's irrigation. Then there is a great difference in the toleration of salt by different crops. Mangolds, beets, sunflower, sorghum, artichokes, and asparagus will stand relatively heavy quantities of salts; most of the legumes, on the other hand, are decidedly sensitive. Maize is in marked contrast to sorghum, while most of the cultivated members of the mustard family are also susceptible. Again established plants will stand much more salt than young plants of the same order. A Californian report, for instance, states that while young lucerne will hardly exist in soil containing 13,000lb. of salts per acre in the first 4ft. of soil, established lucerne will live in soil containing eight times as much salt. I will have occasion later to refer to a local instance of this. Hilgard, of California states that water containing as low as 40grs. of salt per gallon may be dangerous if consisting chiefly of sulphates, chlorides, and carbonates of potash and soda, and even less of magnesia may be dangerous. He also states that in general practice in California the upper limit of mineral content in ordinary practice lies below 70grs. per gallon. In Egypt, however, water containing as much as 200grs. per gallon is used at times, but great care is exercised to prevent, by leaching with good water, the accumulation of salt. Another authority puts the danger limit at 100grs. per gallon—above this care must be taken that the conditions are suitable to the removal of any accumulation of salt by leaching at short intervals. Having dealt with some of the general aspects, I propose now to refer to local experiences and results. In our own district of recent years quite a number of relatively deep bores have been sunk, and in nearly every case good supplies of water have been obtained. I have been able to have several of these analysed with the following results (shown in grains per gallon):—Bore No. 1—123ft. (*a*) sodium and other chlorides, 53.6; calcium and other carbonates, 26.5; total, 80.4. Bore No. 2—113ft. (*a*) sodium and other chlorides, 34.4; calcium and other carbonates, 25.7; total, 62.2; (*b*) total, 82.6. Bore No. 3—80ft., sodium and other chlorides, 50.8; calcium and other carbonates, 28.2; total, 83.2. Bore No. 4—130ft., sodium and other chlorides, 59.1; calcium and other carbonates, 30.2; total, 98.9. Bore No. 5—82ft. sodium and other chlorides, 26; calcium and other carbonates, 11.6; total, 38.8. All these waters have been used freely on various crops. No. 1 is from bore near Mr. G. W. Summers' residence, No. 2 on R. H. Hewett's, No. 3 on Mr. W. L. Summers, No. 4 on Mr. T. C. A. Magarey, No. 5 on Government Orchard. It will be noted that there are two samples from No. 2, the second after six months' pumping. It is evident that the first sample was not representative of the actual flow. Nos. 1, 2, and 3 are practically identical, though No. 1 is two miles away and on the opposite side of the valley to 2 and 3. So far I have used the water through sprinklers on all classes of culinary vegetables, on lucerne, and in the flower garden, have started vegetable seeds and also lucerne with it, and I believe I can say without the slightest trace of damage, though I admit I had what appeared to be a trace of burning on perennial phlox, and some balsams and zinnias, but I am inclined to blame the unseasonable summer, as the majority of my balsams and zinnias did well with liberal waterings. I believe my results correspond with all the others, excepting Mr. Magarey, who has had some 'scalding,' and he will doubtless be able to tell us on what variety of plants. While I only know of one case in the valley, Mr. W. Cullen's, where the underground water has been too salt to use, several of the shallow wells contain a higher percentage of salt. On the Blackwood ridge, however, I believe most of the water in wells is decidedly salt, and even in the deep bore on Mrs. Davies Thomas's property this was the case. I have very little doubt that with our heavy winter rainfall the water from all five of the bores referred to can be used freely without the slightest risk, except, possibly, No. 4, and this should be quite safe except for really tender plants. On the Adelaide plains we have large numbers of bores and wells from which water is pumped for irrigation. Round Glenelg, Richmond, Fulham, &c., water containing up to 95grs. per gallon is used with great success for many crops, and particularly lucerne. Some to the south and east of the city, containing from 100grs. to 150grs., have been used, but I have no details as to results. North of the city there are several supplies containing over 100grs. per gallon used for lucerne. At the Abattoirs there are several bores from 270ft. to 350ft. in depth, giving water carrying from 158grs. to 277grs. per gallon, and with the exception of the latter these have been used freely for lucerne growing with great success. Two bores, one giving water with 170grs., and the other 204.5grs. per gallon, are coupled up, and the water used regularly for lucerne, but it is necessary to start the lucerne in the

winter, as until several months old the plant is not able to stand this water. Another interesting case of water containing an unusual amount of salt being used successfully may be quoted. Mr. E. Gill, of near Spalding, is using water containing 183grs. of solids per gallon, 88.2grs. being chlorine, and 10.35grs. magnesia. The soil is a dark loam with limestone subsoil at from 8in. to 2ft. Apparently the drainage is good, and at times water of much better quality is used, but at the same time it is surprising to find that after 10 years' use in large quantities splendid results are still being obtained with trees, lucerne, and all classes of vegetables. A careful investigation of the waters at present being used with success for irrigation together with examination of the soil and subsoil would give results of great value to all interested in this important subject."

CHERRY GARDENS (Average annual rainfall, 35.03in.).
June 5th.

PINE PLANTING.—This subject was dealt with in a short paper by Mr. H. J. Paddick. When the site selected for planting pines was a wet one, he said, it was well to make a hole about 18in. deep, and into this put some rubble. The object was drainage, and so check any tendency to destroy the roots. If that provision was insufficient, a small drain could be cut from the hole. If that practice were adopted, immediately the weather became finer the drain should be filled. When the young trees were put in the roots should be surrounded with some light loose soil. That would enable them to make a good start. In reply to questions, the writer of the paper recommended putting the trees in to the same depth that they were growing in the nursery, and in wet districts it was best to plant at the end of winter. In the drier localities earlier planting could be practised.

CLARENDON (Average annual rainfall, 33.67in.).
June 4th.—Present: 13 members and three visitors.

PRINCIPLES OF CULTIVATION.—This was the title of a paper read by Mr. E. A. Harper. First of all, it was necessary to consider the class of land one had to work. If stony, shallow cultivation was better; but if one had a good depth of soil, it could be cultivated deeper. The plough was the main implement used, and careful consideration should be given to local climatic conditions as to the time to start work. As a rule, the first ploughing should be commenced soon after the first good autumn rains. Sandy soil could be worked almost at any time. The character of implements used in cultivation also had an important bearing, both on the progress of the work and its results. Rough and stony land should be ploughed with the stump jump implement. Those ploughs did very good work, and were especially adapted to that class of country. Double furrow set ploughs were preferable, provided one had good clean ground and steep side hills to work. The best way was to plough in order to conduct the water on gentle slopes. As to the depth of ploughing, one had to use one's own judgment. He believed stubble ground, if ploughed for crop, should be worked to a depth of 5in. to 6in. Land on which peas had been previously grown, if free from weeds, should be scarified soon after the first rains, to encourage the weeds to grow, and then at seeding it should be gone over again with a light cultivator. If it were weedy, it should be ploughed shallow, say, 2in. to 3in., just in order to turn it over. It should not be rolled too much. It was better to have it slightly rough than too fine.

HARTLEY (Average annual rainfall, 15in. to 16in.).
May 2nd.—Present: 13 members.

THE AGRICULTURAL BUREAU.—Mr. F. Lehmann contributed the following paper with this title:—"After being a member of the Agricultural Bureau for over 20 years I would like to give you an account of its usefulness to the farming community. It brings together farmers within a radius of from 10 to 15 miles to discuss matters relating to their interest, and through those meetings they become more social than would be the case otherwise. The ambitious farmer comes along because he can excel his neighbors in some line of farming, and takes pleasure in giving or getting information in his special line of study. One farmer will take the Merino sheep as his hobby or line of profit; from him you can get points on

wool-growing. Another will raise sheep for the meat market, and tells you the Crossbred pays better than the Merino. Another will be a horse fancier; he will give you horse talk, not always expert, but which will raise discussion, and so has its value; so we may go through the whole of the farm in 12 months and gain some knowledge at every meeting. In the farming community, as in other trades, you have the theorist as well as the practical man. The practical man tells you what he has done; the theoretical member tells us what we should do to improve on our methods—often quite right when put into practice. Some have an objection to such members, but if their teaching is good, let us benefit by it, not trouble about what he does or does not do. At our meetings we have the talker and the silent one—who derives the most benefit is doubtful. The homestead meetings are very valuable to the Bureau, as also are the drives around the district, during which we can see what others do. The object of the Bureau is to gain knowledge by exchange of thought or practice between farmers, or from the heads of the Department; so it rests with members how best to get our brains to guide our hands so that we will get the best results from our work. The Agricultural Bureau is doing this; but we have only started."

MACGILLIVRAY (Average annual rainfall, 19in. to 20in.).

May 8th.—Present: six members and one visitor.

PIG-RAISING.—Although we are somewhat handicapped in the distance from market, pigs have not received the attention that should be given them by farmers in the district, said Mr. R. Wheaton in a paper on this subject. When properly managed three or four breeding sows should prove the most profitable sideline of the farm. There was no farm animal that ate more in proportion to its weight, or turned its food into a saleable carcass so rapidly or efficiently as the pig. Under natural conditions the pig was a grazer, and for sows and growing pigs green feed should form the greater part of the ration, and when possible they should graze it for themselves. A convenient spot on a piece of rising ground should be selected for the sties, which should be well ventilated, but not draughty. In addition to the sties it was necessary to have four or five plots of from half to one acre each, well fenced with pig netting, and two barb wires, one along the ground, and the other 5in. or 6in. above it to keep the pigs from rooting the netting. In those plots most of the green fodders could be grown, and they could be fed off consecutively. With a little care a good supply of succulent feed could be available for most of the year, and that advantage should more than compensate for the little extra trouble and expense in marketing. The following crops had been grown successfully in the district:—Cape barley, rape, peas, turnips, chou moullier, silver beet, pumpkins, pie melons, mangolds, and lucerne, and by selecting those most suited to our conditions one was placed under they would supply the necessary green feed for the year, and thus reduce the cost of raising pigs in comparison to feeding grain alone. A supply of grain was also required, and Cape barley made good feed besides being a good yielding crop to grow. Any grain could be used, but barley and oats must form the main feed, the former for fattening, and the latter for store pigs. All grain should be well soaked or crushed, preferably crushed. As to which was the best breed, that was a matter of opinion. He preferred the Berkshire, but whatever the breed the pigs would not be a success unless well fed. The boar was the first consideration. It should always be pure bred, and the best that could be secured. It should not be used for stud purposes until eight months or nine months old. The sow should be long, roomy, and deep, with broad loins and a strong back, qualities which gave capacity for big litters. She should possess about 12 evenly-formed teats, and should not be mated until eight months old. If used too young she would either produce small litters or larger litters of uneven pigs. When a sow produced a small litter of four or five, that number of teats was developed at the expense of others. Should the next litter be large some of the pigs would be poorly developed, as they would have to depend on nourishment from poorly developed teats. A sow should produce two litters a year, and breeding should be arranged so that sows did not farrow in winter time; March and September were the best months. The weather was then more temperate, and better for the sow, and there was not the risk in rearing the young pigs. During the period of gestation the sows should have the run of a block of green feed. When that was good they would not require much else, but if green feed was not up to the mark a little crushed grain would be necessary at night time. Sows should not be too fat, or a

whole litter might be lost. About a week before farrowing they should be put in the pen, and fed on green and soft food. After pigging they should be gradually fed up with crushed grain and milk, and should be given as much as they would clean up. At three to four weeks old the suckers would begin to feed themselves, and should be fed in a shallow trough away from the sow. At four to five weeks the boar pigs should be castrated, and at seven weeks they could be weaned. They should be well fed for two or three weeks after weaning, when they could be put into a good plot of green feed and given crushed grain every evening. When old enough to be fattened they should be brought back to the pens and given as much crushed grain and milk as they would clean up three times a day. Pigs should not be sent to market unless they were prime, as with all classes of stock, it was the good quality that brought the best prices. Pigs should always have access to a trough of clean water, besides the other food that might be given. It was also necessary to have some charcoal in the yards. In each small paddock a good shelter should be erected so that the pigs would be dry and warm and always be supplied with bedding. If they were not comfortable they would never do well. In the discussion that followed Mr. Petras favored boiling mangolds and turnips, and when boiled putting in corn. Mr. Williams considered pig-raising most profitable when combined with dairying, and with the Chairman (Mr. Nicholls) said that potatoes could be grown, and, when cheap, could with advantage be fed to pigs. The Chairman was of the opinion that the market was too uncertain to keep a number of pigs.

MILANG.

May 12th.—Present: 27 members.

AFFORESTATION.—In dealing with this subject Mr. Yelland emphasized the fact that people should raise their own trees, and thus acclimatise them to the locality. Trees grown by himself were found to be hardier, withstood both winds and frosts better, and very seldom failed to start when planted out. He also stated that landholders, who so desired, should have the right to be allowed to plant trees on roads adjoining their holdings, which formed a valuable asset, and added greatly to the beauty of the holding. The trees gave a much-needed shelter to stock in the hot months of the summer season, and in winter gave natural warmth. Mr. Yelland answered numerous questions, and gave a practical demonstration of pruning fruit trees and vines.

MILANG.

June 9th.—Present: 37 members.

SIDELINES ON THE FARM.—Mr. A. D. Matheson contributed a paper on this topic. He said dairying, sheep-breeding, horses, pigs, poultry, &c., represented the chief sidelines to which almost every farmer could apply himself. It was difficult to define what was the standard of cows to keep, but without judicious hand feeding one could not derive the full benefits. Cows which for the first three months after calving were giving about 3galls. of milk per day with a butter test of 4 per cent., would be a valuable asset. Grazing on good pastoral land was undoubtedly the best, but chaff and bran given twice a day to good cows would materially assist in making them a profitable sideline. Good labor and attention were essential, and he thought it unadvisable to keep too many cows, or they would probably be neglected during the busy seasons. Sheep were necessary in order to obtain the most from one's holdings. Present high prices for wool and lambs and the good they did in manuring and keeping fallow clean, made them practically indispensable. The great demand for Australian horses, brought about by the war, and the numbers lost through the last drought were two very good reasons why every farmer should raise as many foals as possible. There was hardly anything more profitable on the farm than pigs. At present the three breeds most in favor were the Middle York, Berkshire, and Poland China. Of these three the best milker was the Poland China. She usually had large litters, and reared them. Many farmers thought the Poland China the best type of pig to keep, but the Berkshire cross was also good, being very hardy and contented. He favored the Berkshire-Poland China sow put to a Middle York boar, providing one had good feed to push them forward. Sows did best on herbages, with a paddock to run in, as it provided exer-

cise, and enabled them to secrete more milk. It was advisable to pen them a fortnight before farrowing, and to feed with a mixture of two of pollard to one of bran. A farm without fowls was so rare that it would be odd to advise a farmer to keep poultry. White Leghorns, with their wide reputation, were sufficient guarantee that fowls were profitable. Geese and turkeys when the demand was good would also return good profits.

MOUNT BARKER (Average annual rainfall, 30.93in.).

June 6th.—Present: 43 members and 28 visitors.

Mr. F. E. Place addressed the meeting on "The Horse Suitable for Farm Purposes." An interesting exhibition of potatoes took place. Messrs. Pope Bros., won the certificate for the greatest yield from quarter of a square chain of land—8cwts. 3qrs., equallying 17½ tons per acre, and the cwt. of largest and truest to type of any one variety of potatoes. Snowflakes alone were exhibited. Mr. F. Simper won the certificate for the dozen heaviest potatoes—his exhibits weighed 37lbs. 12ozs.; largest potato, 5lbs. 9ozs.

STRATHALBYN (Average annual rainfall, 19.28in.).

June 12th.—Present: 19 members.

ROPE MAKING.—Mr. Abbott, with the assistance of his two sons, gave a practical demonstration of making rope from binder twine as taken from sheaves after the knots had been cut. His machine was of his own invention, and in a short time he made a first-class piece of useful rope. Hay or plough lines could also easily be made, he said. Mr. W. M. Rankine gave an exhibition with a machine that he had purchased for doing the same work. Members were of the opinion that Mr. Abbott's machine was equally successful, although three were required to work it.

INMAN VALLEY, June 7th.—FARMING MACHINERY.—A paper was contributed by Mr. G. McCoy on this subject. He traced the history of farming from the days of the scythe to the present day, and expressed the view that the reaper was more suited to this district than the harvester.

KANMANTOO, June 2nd.—Mr. H. R. Shepherd contributed a very interesting paper of his experiences while on active service abroad.

LONGWOOD, June 9th.—HOMESTEAD MEETING.—Members inspected Mr. Cole's garden. He had planted as an experiment 26 varieties of grapes and a number of prunes, and as the locality was not considered favorable for the growing of vines, much interest will be taken in their progress. The Hon. Secretary (Mr. J. R. Coles) read the annual report. A splendid sample of Garton Early White oats was tabled.

MORPHETT VALE, June 9th.—Members discussed the difficulty of drilling in sticky ground, and the advantages of disk drills and ploughs in various soils. The combined plough and drill was considered worthy of a trial in this district.

PORT ELLIOT, June 16th.—Mr. H. Green tabled a splendid sample of dried apricots and horse beans. Owing to small attendance it was decided that Mr. Green should read his paper at next meeting.

URAIDLA AND SUMMERTOWN, May 7th.—Mr. G. A. Dunn, M.P., attended and gave a lecture on "The Methods of Co-operation in the Fruit Industry," which was appreciated by the members.

SOUTH-EAST DISTRICT.

GLENCOE (Average annual rainfall, 33.84in.).

April 5th.—Present: eight members.

"THE SELECTION AND CUTTING OF SEED POTATOES," was the title of a short paper contributed by Mr. A. von Duve, who mentioned that imported seed yielded better the second year, as the first year's planting was not acclimatized. The seed should always be cut toward the crown, and in squares, as they then retained the sap much better. Mr. F. A. Telfer said that he did not consider that it mattered which way a potato was cut, if only the setts are large enough. He did not believe in

planting round seed at all, and bought big potatoes from other districts every year, and he was quite satisfied that it was a profitable system. He did not believe that Glencoe land was worn out for potato growing, but with good seed, cultivation, and the return of summer rains that they had missed of late years, crops would be as good as ever. Mr. J. Fraser agreed with Mr. Telfer that the system of cutting was immaterial if the setts were large enough so that they would not shrivel up. He mentioned that years ago he had known a grower at Mount Gambier plant potatoes 18in. apart for the purpose of growing potatoes seed size. Mr. A. Dow said that some years ago he imported seed from two different places, and also bought local seed, and the local seed gave the best results. Mr. J. Dow said that in his experience seed from peat or sandy soil gave the best results. The secretary had found that lime sprinkled on the cut potatoes formed a coat on the cut surface arresting decay, and also making them much better for handling when planting.

GLENCOE (Average annual rainfall, 33.84in.).

May 3rd.—Present: 13 members and one visitor.

IRRIGATION.—A short paper on this subject was read by Mr. J. Dow. After considering this question he said he had come to the conclusion, on account of the nature of the soil, that it would not be profitable to practice irrigation in that district by means of flooding. Water would have to be applied by means of sprinklers. It would not pay to irrigate potatoes on account of the uncertain market. The Secretary hardly thought that irrigation was necessary in that district, as with thorough cultivation good fodder crops could be grown without it. With irrigation it was necessary to have some system of underground drainage to prevent the land from becoming waterlogged. He suggested that it would be well to have the well water analysed to make sure that it was suitable for irrigation purposes. Mr. M. D. Cameron strongly advocated that farmers should establish plots of lucerne for irrigation, and was convinced that Glencoe would develop to its highest production by lucerne growing under irrigation and dairying. He did not consider there was any need for underground drainage, as the soil was so porous, and the rainfall so great that any injurious effects would be cleared away. Lucerne should not be sown on low-lying land where the spring waters were likely to rise to the surface, as that was absolutely fatal to lucerne. Mr. R. Agnew said that a neighbor of his had a small paddock of lucerne, portion of which was irrigated by sprinklers, and the remainder unirrigated. The irrigated portion had yielded five cuts for the season, and the other was no good at all. Mr. H. Bodey said that in the Wimmera the lucerne was cut and then flooded every six weeks during the season. Mr. T. F. Gratwick was of the opinion that irrigation would not be a payable proposition on Glencoe. Mr. A. Dow had known splendid results as far as growth was concerned by irrigation, but in one case that he had in his mind, it was said that the water cost more than the fodder could have been purchased for. Mr. J. T. Halliday said that lucerne should be sown in August, and the first cut made as soon as possible, then it should be irrigated and well harrowed, for it would stand any amount of cultivation; care should be taken, however, not to irrigate too late in the autumn, otherwise mildew and thrip would develop. Cabbages, swedes, and other fodder crops would also pay well under irrigation. Water should not be pumped direct from the well to the land, but into a tank, to allow it to aerate. Pigs would thrive well on lucerne as well as cattle, horses, and sheep. Mr. L. Flett said that lucerne would have to be cut while very tender to feed to pigs, as they would not eat hard stems.

KALANGADOO (Average annual rainfall, 33in. to 34in.).

May 12th.—Present: 11 members and one visitor.

FODDERS.—Mr. John Davison addressed the members on "Fodders," also "Red Clover, and the Value of the Bumble Bee as a Seed Fertiliser." He said a variety of fodders had been tried on a small scale with success in the district. Kalangadoo soil had proved capable of growing maize 9ft. high, yielding 30 tons per acre on land too wet for oat growing. He strongly recommended growing lucerne for cattle, sheep, and pigs. Lucerne grew bulky in the lower South-East without irrigation, but with water the results were greater. One could scarcely estimate the increased carrying capacity for sheep and cattle in the stretch of territory between Bordertown and Mount Gambier, were the land cultivated and sown with damp land grasses, such as lucerne, red clover, cow grass, alsike, Timothy, and so forth. Eng-

lish and Italian rye grass, white and strawberry clovers, and schanck on the drier banks produced excellent feed, and were established already in quite a few spots. The speaker advocated the liberal use of farm and artificial manures, and the extensive sowing of Cape barley for autumn and winter feeding of cows. The splendid samples of red clover (*Trifolium pratense*) he had seen growing at Kalangadoo proved that the land was only waiting to be tickled with a hoe to laugh itself into a harvest. Red clover was one of the staple hay fodders of most European countries, and in New Zealand some landholders had up to 700 acres of it for the production of feed and seed. The lower South-East was the closest approach in Australia to the moist farm lands of New Zealand, and red clover, and its cousin, cow grass, were worth anything from £10,000 to £100,000 a year to the farmers of the Dominion for dairy cows, sheep fattening, and hay purposes. In a few spots in the South-East, where it had been given a chance, red clover had done well. It was a permanent plant, a gross producer, and belonging to the leguminous family, improved the soil upon which it grew by collecting nitrogen. Mr. Davison then dealt at length with the history of the bumble bee, and its introduction to New Zealand, and showed the value it was in bringing about the fertilisation of red clover and alsike.

KONGOROÑG.

June 5th.—Present: 14 members and four visitors.

DAIRY FARMING.—"Among our agricultural pursuits, dairying holds first place, from the standpoint of the necessity for a broad scientific education," postulated Mr. H. W. Bannister, in a paper dealing with dairy farming. "It also ranks high as a remunerative industry, when conducted on business principles and with the proper class of cows. It is useless entering the dairy business unless there is a natural liking for the cow, and a keen desire to help her to do her best. After all, much depends on the man. To be a successful dairyman a man must first be a successful farmer, he must understand soil conditions and the growing of crops. He must have a good farm well farmed, as well as a good herd well cared for. Every crop grown on the farm has a value as a fertilizer, and when sold permanently removes that amount of fertilizing matter from the farm. Very often a man will make a profitable investment by buying a run-down farm at a low figure, and stocking it with dairy cattle will return the manure to the land, improve the exhausted soil, and raise good crops in a few years. The health of the cows and the purity of the milk depends greatly on the stables. Four things are of prime importance—sunlight, pure air, tight, dry floors, and the comfort of the animals. When the air of the stables is filled with offensive odors, it is carried into the milk pail, and the damage is done. A good floor is made of cement, made up of, say, one part of cement, two and a half parts of sharp sand, and five parts of broken metal. After thoroughly mixing the whole dry, water should be added evenly with a watering can, the whole meanwhile being well turned over and mixed together. Lay the floor 4in. thick and trowel it to a smooth surface in one operation. The floor should have a fall of not less than 2in. in 10ft. Nothing adds so much to the general appearance of a homestead as having all the buildings painted; besides, the paint preserves the wood. If oil paint cannot be afforded, a good durable whitewash is a good substitute. It makes old buildings look as good as new. A good whitewash for outside is to slake ½bush. of lime in boiling water, strain to remove all sediment, add 2lbs. of sulphate of zinc, 1lb. of common salt, and ½lb. whiting, thoroughly dissolved; mix to proper consistency with skim milk, and apply while hot. If white is not desired, add enough coloring to produce the desired shade. We hear a great deal about the dual-purpose cow—one suited to produce milk and beef; but if dairying is the object, it is best to keep to the dairy breeds. The cows have already earned their way, and a profit from the carcass at the end of a useful life should not be expected. We should decide on one breed, and keep to it. Nothing looks better than a herd all of the one breed. The sire should always be pure bred, of good milking strain. Too much importance cannot be placed on the influence of the sire in establishing a good dairy herd. The cows need not be pure breed, but should be good grades. The breed is of importance, but the individual cow is what really counts. Every dairyman should have a certain minimum yearly milk standard, and if after a second trial a cow does not come up to it, she should be discarded. But be sure it is the cow's fault, and not the owner's, before you part with her. Many a good cow cannot do her best on the slim allowance of food and water and the indifferent care she gets.

The best dairy herds are built up by raising the best heifer calves from one's own best cows. Calves from cows that have been in good condition before calving are invariably the strongest. A cow must be well fed and cared for if she is to keep up a flow of milk and at the same time nourish her unborn young. She should have a rest from milking from six weeks to eight weeks, in order to produce a vigorous calf and do better during her next milking period. Many farmers, as soon as a cow becomes dry, allow her to hunt for her living in one of their worst paddocks, excusing their neglect by saying she is doing nothing for her board. Is she not preparing herself to work again every day for 10 or 11 months, besides presenting her owner with a calf? Some stint the food, fearing milk fever. This is not to be dreaded if the cow is properly handled after calving. The main cause for this frequently fatal trouble is milking the cow out clean soon after calving. Only a little milk should be drawn at a time, and this should be done several times a day for the first day or two; this is how a calf would take it. A good plan is to leave the calf with her for the first 24 hours. If milk fever develops, it is usually a fatal mistake to dose. In many cases, the muscles of the throat are paralysed, and the cow has no power to swallow, and the medicine given goes into the lungs, and often causes death. The treatment giving prompt relief, and one to be relied on, is filling the udder with air by means of a pump. Tie the teats with tape to keep in the air. Massage the udder, to force the air to all parts. It may be necessary to repeat the inflation. This treatment usually effects a cure in a few hours. Do not give any medicines. Where a large number of cows run together, it is a good plan to have them dehorned. Calves may be dehorned when a few days old. Clip the hair where the rudimentary horns appear, and with a moistened stick of caustic potash rub the little buttons of horns until the skin becomes inflamed and tender to touch.'' In discussing the subject, Mr. W. Aslin objected to the pure-bred animal on the score that it was too thin-skinned for the district. Mr. H. C. Haywood said Jerseys would do well in the district if properly cared for. Mr. C. Kemp preferred the Holstein. Mr. C. T. Atkin did not pay much attention to the breed of the cow, provided she was a good milker. Messrs. W. Aslin and F. Kemp expressed a preference for the Shorthorn milking strain. Generally, members were in agreement as to the value of the use of a bull bred from milking strain. Mr. E. E. Morrison advised the testing of each cow.

SUMMER FODDERS.—''Of the different crops from which we may make a selection, rape must take first place for summer fodders on a large scale,'' said Mr. F. R. Uphill, in a paper dealing with summer fodders. It was most suitable for summer and autumn feeding. Given a good start during the spring and early summer, it would grow throughout the year. Sown about the first week in September, it would be ready to top up lambs when weaned. If not eaten out, it would grow right through the summer and autumn, and also well on into the winter. Sheep must have free access to dry stuff when feeding on rape, otherwise losses would occur. Maize was also a crop that could be grown with profit, making fine feed for cows when fed to them in the milky cob stage. He had maize 4ft. high which was sown in January. It greatly increased the milk yield when fed to the cows in the autumn. Land required to be deeply ploughed, to enable the maize roots to get down quickly, thus securing a quick growth. It made splendid ensilage. Kale was also a very valuable fodder, and when firmly established it could be eaten down very bare, and would come on again. He knew of a plot of kale that was sown on October 7th, 1914, which had 40 sheep to the acre on for two months, and there was still plenty of feed left. It had had stock feeding on it off and on ever since, and it was still doing well. Unlike rape, it was not necessary to have dry feed, as sheep would not bloat on it. Rape and kale could be grown successfully on some of the poorer soils, and by continuously growing fodder crops and feeding them off the land would be enriched. Sandy soils and ferny country could be improved in that way. In a district like that, where bush fires were so much of a danger, it would be resplendid thing if every landholder would take a strip of land 2ch. or 3ch. wide on one side of his holding (all agreeing to do the same side), and put in rape or some other fodder. He would have a fire break, and the feed would soon pay for the extra fence that would be required. In reply to questions Mr. Uphill said rape should be sown in September or October. Kale was seldom attacked by blight. He advised planting maize by broadcasting the seed and ploughing it under. Mr. G. Willy thought payable crops of rape and rye could be grown on poor soil if a dressing of superphosphate were applied.

MILLICENT (Average annual rainfall, 29.25in.).

June 12th.—Present: six members.

SUGAR BEET INDUSTRY.—This was the topic of discussion opened by Mr. Holzgrefe, who said it was of considerable interest to the Branch. Mr. Hart was at present at Maffra, in Victoria, inquiring into the industry. A discussion also took place on the means to awaken interest in the monthly meetings of the Bureau. Reference was made to the visit of Mr. Place, the Government Veterinary Surgeon, to Millicent, and the valuable address which he delivered. The Secretary complained of the disappointing attendances to the meetings of late. Members thought a better plan, although not suitable to all, would be to hold the meetings at night. After further discussion, it was decided to postpone a decision until the annual meeting.

MOUNT GAMBIER (Average annual rainfall, 32in.).

June 9th.—Present: 18 members.

NOXIOUS WEEDS AND THEIR ERADICATION.—The Hon. J. Botterill delivered an address, in the course of which he referred to a number of weeds of a noxious character which were now growing in or which threatened to invade the district. Star thistle and stinkwort, he said, were a great danger to the part of the district, and another weed that was objectionable was Jeffrey burr. If the matter of destroying the weeds were taken in hand now, a great deal of trouble and expense that would otherwise be incurred at a later date would be saved. The district council, he thought, should insist on the destruction of the Canadian thistle. He dealt with the danger of allowing different weeds to mature their seeds, and said the time to start destroying weeds was whilst they were still confined to a limited area. In the course of a lengthy discussion which followed, Mr. MacCormack mentioned that cultivation would kill the Canadian thistle. Mr. Botterill stated that he had cut a patch regularly below the ground for a period of nine years, and it still remained. He had destroyed small patches of stinkwort by uprooting it. Mr. Sassanowsky said the best way to destroy "fat hen" was to pull it up, especially after rain.

KEEPING APPLES.—Mr. A. J. Wedd laid on the table some fine samples of apples grown by him at Ardno. He had brought a few that would suit a cottage garden. The names were—Nickajack, Rome Beauty, London or Five-crowned Pippin, Adams's Pearmain, one of his own seedlings, Wolseley, Northern Spy (an early sort that took a long time—sometimes 10 or 12 years—before it bore fruit), French Crab, Lawrence, Cleopatra, and Hoova. He also tabled a few pears. Jonathan apples were really good keepers. Cleopatra was very subject to black spot, or fusicladium, in that district. In some districts it was not, and was the very best apple. The only remedy he knew was Bordeaux mixture, but it must be applied when the apples were forming. They could spray now for mildew or woolly aphis.

NARACOORTE (Average annual rainfall, 22.60in.).

June 9th.—Present: 19 members.

ORGANIC MANURES.—A paper dealing with this topic was read by Mr. A. Johnstone. "In this class are included all substances of vegetable or animal origin which have the property of enriching the soil or of rendering to it substances required by plants for food. All vegetable and animal substances used as manures must undergo decomposition before they become the food of plants, for the roots of these only absorb liquids and gases. This change is generally effected to a certain extent before they are applied to the soil; but in the case of green manures it takes place entirely in the soil. The results of the decomposition of organic manures are the formation of carbonic acid, ammonia, sulphuretted hydrogen, and many other compounds, which are retained in the soil, and from which they are taken up by the roots of plants. Leaves, when thoroughly decayed and reduced to the state of mould, form a kind of manure, which, alone or mixed with the soil or other substances, is eminently suited for the growth of most plants. Dry leaves, when used as litter, absorb perhaps less urine than straw, but as they contain much

more nitrogen, they increase greatly the quality of the manure. Old tan is sometimes used as a manure, but it exercises an injurious action on the roots of plants, and also tends to promote the growth of various sorts of fungi. Peat may be said to be an accumulation of humus, produced by the decay of plants that have been submerged, and it would then seem to be derived from that which forms the first food of vegetation. But in the formation of peat highly antiseptic properties have been imparted, and which must be neutralized before it becomes fit for the food of plants. But bog earth and boggy swamps are capable of being rendered extremely fertile. To render peat fertile it is necessary in the first place to drain it, for until the water is removed the air cannot enter among particles of the peat, and in the absence of oxygen its elements remain without change. When dry and exposed to the action of air, moisture, and frost it is readily pulverised, and loses in a great measure its astringent principle. The correction of this is largely aided by the addition of lime, gypsum, or calcareous marls. For forming it into a manuring compost authorities recommend mixing the peat with alternate layers of sixth or eighth parts lime. When dry it may be employed as litter for sheep, and when saturated another layer may be spread over. By penning sheep on dry peat large quantities of excellent manure for garden crops may be obtained. Peat may otherwise be economised in two very important respects—first as a deodorizer; second as a vehicle for manure. For instance, when accumulations of nightsoil are removed, the emanations are alike injurious to health and offensive to the sense of smell, and it will linger in the neighborhood for days. But if the workmen sprinkled, as they proceeded, some of the charcoal made from peat, and a quantity over the heap when finished, no smell could be detected next day. Owing to the property which purely powdered peat charcoal possesses of condensing many times its own volume of gases, and notably ammonia, sulphuretted hydrogen, and carbonic acid, all of which are prejudicial to health, not only is smell prevented, but the escape of one of the most valuable constituents—ammonia—is secured. It seems to be owing to its power as an economiser and absorbent of gases that the roots of plants are found clinging around its particles wherever it is mixed with the soil. It is not, however, as a deodoriser of nightsoil only that peat charcoal may be employed with advantage, but to sewage as well. Sawdust is not of much value as a manure. It contains only slight traces of nitrogen, and when mixed with the soil it does not readily decompose. By the addition of liquid manure, of which it will absorb a large quantity, its value is greatly increased, and it is then much more easily decomposed. Rape dust, for turnips and root crops, is an excellent manure. Dissolved in urine rape dust is much used in Flanders. In dry seasons it is less efficacious than in wet ones. Malt dust contains about 4 per cent. of nitrogen, and according to Professor Johnston, its ashes contain 36 per cent. of potash and soda, and over 24 per cent. of phosphoric acid. From this it appears that malt dust forms a very good manure. It ought to be prepared by the addition of urine to the heap, and so causing it to ferment, when it may be applied at the rate of 30bush. or 40bush. to the acre. The beneficial effects of malt dust are owing to the formation of ammonia, and to some extent to the phosphoric acid, potash, and soda which it contains. It is rapid in its action, but is not of much permanence. Green Manures—Plants are sometimes grown specially for the purpose of being ploughed or dug in when they are in a green or succulent state. But whenever the ground is in a high state of cultivation, this practice is seldom adopted. A much more advantageous plan is to apply the green crop to the feeding of animals, in which way not only is manure produced, but food as well. The plants usually employed for the purpose of being ploughed or dug in are rape and buckwheat. There is, however, a class of green manure which is more extensively used in gardens. This consists of potato tops, turnip tops, the dressings of cabbages, rhubarb leaves, and all superfluous or decaying vegetables. But it is better to make them up into compost, and apply them to the soil in a decomposed state. Ferns abound in potash, and may therefore be applied to soils deficient in that element, or to crops which require much of it. Reeds as a manure are commonly employed in the South of France in a green state. Cut when in flower, they soon decompose. Soot consists chiefly of charcoal; its efficiency as a manure is chiefly attributable to its containing ammonia, the amount of which varies in different samples from 1 per cent. to 5 per cent. It should be kept dry till required for use, and applied at the rate of 20bush. or 30bush. per acre. As a preventi e to the attacks of insects, half a peck of soot to a quarter of a peck

of lime, mixed well, and allowed to stand till clear, form a useful wash. If sown together with turnip seeds, it quickly forces the young plants into the rough leaf, a matter of importance, inasmuch as when this is the case, the ravages of the fly are in a great measure prevented. Mixed with salt, it is a good manure for potatoes, and for onions, partly as a manure, but especially preventing the attacks of the onion gall. Asparagus, peas, and a variety of other vegetables may be manured with it, and with as much effect as with solid dung. As a liquid manure, and applied to plants in pots, it causes them to assume a deep healthy green and grow strong and luxuriantly. Blood is a powerful manure, not only on account of its nitrogen, but also on account of the numerous salts which it contains. Blood may be applied to the soil in a liquid state, or when dried and mixed with earth or other substances so as to form a compost. Fish form a very powerful manure and are rich in nitrogen and phosphoric acid. If used in gardens it should be mixed with earth, and plants will not then be liable to injury from the roots coming in contact with large quantities of unmixed and highly nutritious matter. Woollen rags, if chopped up into small pieces and buried in the soil, form an excellent manure. They decompose slowly, and are a good manure for fruit trees. Bones are extensively used in agriculture. Their composition varies according to the sort of animal to which they belong; it also differs in the same animal at different stages. They are used broken into fragments, more finely divided in the state of dust, dissolved in sulphuric or muriatic acid; also, mixed with guano or other fertilizers. When applied in a broken state less is required, and the effects are more lasting than if applied as dust. The quantity of bin. bones or bonedust, from 12bush to 16bush. per acre, according to the nature of the soil, poor soils requiring more than rich ones to produce the same effect. Experience has shown that fresh or unboiled bones are possessed of more beneficial action than boiled ones, on account of the organic matter not being extracted by boiling. The action of this manure is to some extent due to the animal matter in the bones, but principally due to the phosphates which they contain. The soils they benefit most are dry ones that are deficient in phosphate of lime; wet soils are considered as unsuited for this manure. Bones are sometimes mixed with earth, ashes, dungs, etc., and allowed to ferment in order to effect their more speedy decomposition. A better method is to dissolve them with sulphuric acid. Nightsoil is a valuable and extremely powerful manure, richer in nitrogen than horse or cow dung. It can easily be deodorized by the use of charcoal, which is also of great value as an auxiliary manure. The ammonia is also fixed by using sulphate of iron, but it is not desirable to introduce any considerable quantity of salts into the soil; dry earth and sifted ashes are also used as efficient deodorizers. Peruvian guano is so universally known that it is unnecessary to discant on its virtues. Urine forms an exceedingly powerful manure containing various principals, which during putrefaction yields large quantities of ammonia. It should be allowed to putrify, and diluted with water very considerably, or mixed with soil to form a compost; an excellent liquid manure for fruit trees and kitchen garden crops. Human urine is by far the most valuable. Almost any manure can be applied to the ground in a liquid state, nevertheless liquid manure is generally considered to imply the drainings of dung heaps, stables, &c., and it chiefly consists of urine, together with the excrements of animals dissolved by it or by rain. When properly diluted it is very useful in gardening, as it contains the fertilising properties in a liquid state, and is readily taken up by the spongioles of plants. Dung, in most cases, can only be applied before the crop is planted, but liquid manure can be applied at any time during the growth of plants, and it has this advantage, that it can be applied strong or weak, as the condition of the plant requires it. Horse dung is most beneficial on cold stiff soils, and in order that its mechanical action may be turned to advantage the dung should not be much decomposed. Too much fermentation drives out the ammonia. It is well adapted for producing immediate action on crops. Of equal weights of horse and cow dung, the former is the more fertilizing; but taking bulk for bulk of each, it is inferior to cow dung. Cow dung is excellent for dry, hot soils, and for mulching the roots of fruit trees, but only after fermentation is it fit for close contact with vegetation. Pig dung, in an unmixed state, is too strong for vegetation, but when mixed with litter and as much earth as will moderate fermentation it becomes an excellent manure. Composts are mixtures of various earths or manures. Their number may be said to be infinite, and they are of the greatest utility. In general, the best way of

economising all sorts of refuse is to form it into a compost. At the same time lime should never be introduced into composts with substances conteining ammonia or producing it in the decomposition. Flesh, hair, feathers, pond mud, ditch screenings, and numerous other kinds of animal and vegetable refuse may all be advantageously employed as manure.—Mr. Loller said they could realise from the paper that almost everything could be turned into manure, and on many of the farms first-class material for manure was going to waste for want of a little fo thought. The speaker dwelt at some length on the material in households t would make first-class manures which was thrown away. They wanted a manure pit and the use of deodorizers to make this waste material into the finest manures. All that was required was to put systematically a little earth on it. He knew from experience that sawdust was one of the best things for absorbing liquid manure, and rendering it usable to the best advantage. The Chairman (Mr. Holmes) inquired if eucalyptus leaves could be utilized as manure. Mr. Johnstone said they could not be so utilized. There were leaves of certain trees, such as the cedar, pine, and myrtle, which were of no value for making manure. Mr. Rogers inquired if it would pay to plough in a green crop of peas, say, running 15bush. to the acre, as a manure. Mr. Johnstone said it never paid to plough in green feed as a manure. They should always feed off, for thereby they were growing beef and mutton, and also manuring the ground. If they desired to improve their land with a green crop, it would be better to fence portions off temporarily with hurdles, and feed it off in sections, in a similar way as they feed off turnips and mangolds. By that means they would retain the nitrogen in the soil, in the case of peas, as the roots would remain in it. In case of very poor soil, they might plough in a green crop, because it was deficient in humus, and the green feed would supply this deficiency, and therefore greatly improve the soil; but with ordinary land he would say feed off the green crop instead of ploughing it in to improve the land.—Mr. Loller exhibited some excellent pears of the Vicar of Wingfield variety.

SANDALWOOD.

June 9th.—Present: 14 members and one visitor.

FARM MANAGEMENT.—Mr. J. W. Collins read a short paper on this subject. He said a man working a mallee block needed at least four or five good working horses. He should have the necessary implements, but a good 1-furrow plough and tip-dray would suit the beginner in a small way. Drill, binder, harvester, and harrows were also essential. The land should be ploughed and prepared for seeding during May, and be given a light sowing, and as much super. as one could afford. Every beginner should aim at having a stack of hay. Horses required special attention in that locality, and should be well rugged or housed and carefully fed. The chief object was to get one's land as clean as possible. A good discussion followed, after which the election of officers took place.

MILLICENT, May 19th.—NOXIOUS WEEDS.—A good deal of attention was directed to the question of noxious weeds growing in the district. Various useless weeds were mentioned by Mr. Bowering. Mr. Holzgrefe thought the most troublesome weed met with in the district was the star thistle. Mr. Mitchell thought the pes eould be overcome if landholders would realise its seriousness. He suggested tha the district council might pay the landholders a small sum for clearing the road adjoining their respective properties.

SANDALWOOD, May 14th.—Farming in mallee soils was the subject of dis cussion brought forward by Mr. Wattchow. He pointed out the necessity fo doing all that was possible to ensure a good burn, and to work the land for seeding with light skim ploughs. Share implements in preference to disk. Th speaker recommended fallowing to a depth of 3in. to 4in. as being best suited t mallee land. Members in general agreed with the speaker's views.